The Role of Environmental Impact Assessments in Coastal Zone Management: A Comparison of Boundary Bay, British Columbia and Cherry Point, Washington

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THE ROLE OF ENVIRONMENTAL IMPACT ASSESSMENTS IN COASTAL ZONE MANAGEMENT

A Comparison of Boundary Bay, British Columbia

and Cherry Point, Washington

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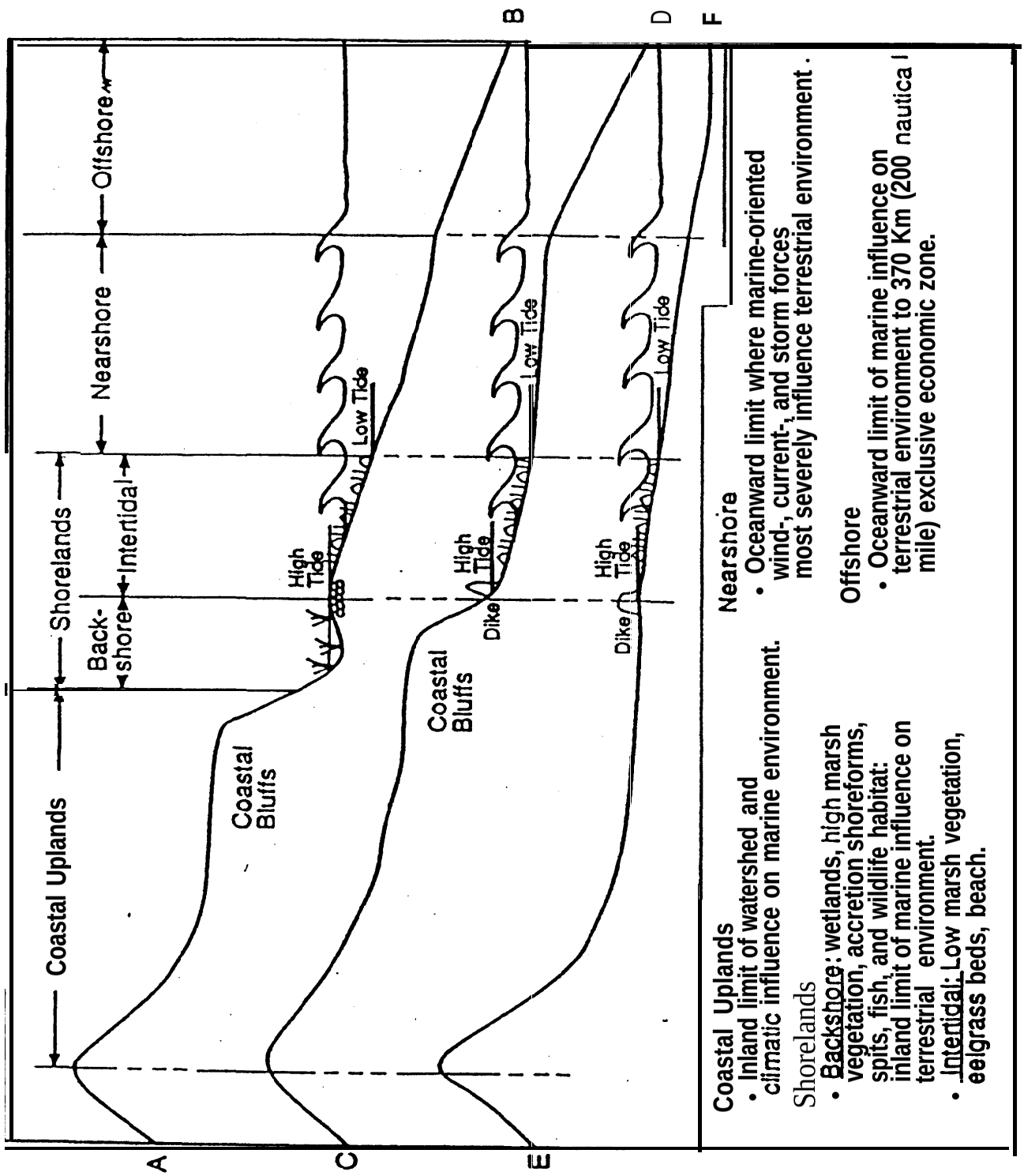
Abstract *This study comparatively evaluates the consequences of the institutional systems adopted to manage the Boundary Bay, British Columbia and Cherry Point, Washington coastal zones. In the absence of mandatory standards or regulations for controlling coastal zone developments, the Boundary Bay shoreline and nearshore environments are rapidly deteriorating from expanding urban encroachment, despite the area's internationally-significant resource values. In comparison, the Cherry Point Industrial Management Unit is guided by a highly-structured system, which provides regulatory agencies, publics, and industry with clear policy direction for balancing economic mandates with conservation and preservation needs. Policy recommendations are made to improve the governance of the British Columbia coastal zone based on this study. These include: the need for new coastal zone management legislation and institutions; uniform adoption of environmental impact assessments for regional resource planning and project approval; increased financial commitment to planning and management; meaningful opportunities for increasing the public's role in planning and decision making; and, coordination within and among federal and provincial regulatory agencies with coastal mandates.*

Keywords: *water quality, ecological protection, public access, esthetics, natural hazards, water dependency, environmental impact assessment, coastal zone management, Boundary Bay, Cherry Point.*

INTRODUCTION

The coastal zone is defined as extending seaward from the shoreline to include the outer limit of federal jurisdiction (fig.' 1). Landward it includes significant coastal-related wind, erosion, and flooding processes as well as ecologically important marine, lake, and riverine features such as estuaries and wildlife habitat. In comparison to inland environments, it is more richly endowed with renewable natural resources, most notably productive fisheries, soils, forests, and the recreational potential of coastal waters, beaches, and shorelands.

Figure 1. Typical Coastal Zone Cross Sections.



The purpose of coastal management is to encourage well-planned economic development while balancing environmental protection and conservation needs to promote sustainable resource management (Washington, 1976). Coastal areas satisfy a variety of needs, but these uses often conflict or are mutually exclusive; they are competitive demands on a finite resource. Inherent in this definition is the necessity for the formulation and administration of policies to resolve conflicting interests in the coastal zone.

Several approaches for managing coastal resources are practiced depending on a jurisdiction's constitutional structure and resource allocation priorities. Typically, the system adopted should enable effective resolution of conflicting interests for balancing sustainable economic development pressures with long-term environmental protection and conservation needs. Such approaches may range from the highly structured American system to the loosely coordinated Canadian institutional arrangements. However, it is widely recognized that several different means or instruments are possible for achieving the same policy objectives (Trebilcock et al., 1982). This theory is tested in this paper by examining the consequences of the differing Canadian and American approaches to coastal zone management. The 2 systems are examined by way of a case study analysis which comparatively evaluates water quality, ecological protection, public access, esthetics, natural hazards, and water dependency. These parameters are deemed to be the most significant management priorities for achieving comprehensive coastal zone management based on the recommendations of a 1978 Canadian Council of Resource and Environment Ministers (CCREM) conference to address shore area problems, and on the mandate of the 1972 American Coastal Zone Management Act.

Selected evaluative criteria are used here to judge the strengths and weaknesses of the Canadian and American approaches to coastal management. These are efficiency, effectiveness, and equity. Agency policies, programs, and practices are efficient if they are clear, consistent, and compatible. Agency personnel must be able to respond in a timely manner to all situations for early acceptance of beneficial development proposals, or rejection of detrimental ones which could: threaten fish and wildlife habitat, increase personal and property losses from coastal hazards, or degrade the quality of, and access to, the coastal zone with developments which do not require a water-oriented location.

Similarly, to be effective, the various policies, programs, and principles within agencies and between government departments must be directed toward common goals and objectives. A series of means or instruments are usually needed to achieve the ultimate goal or objective in policy making and implementation (Trebilcock et al., 1982). For coastal management, these include administrative mechanisms aimed at: improving water quality, enhancing and protecting ecological resources, increasing public access, maintaining viewsheds, avoiding areas prone to natural hazards, and ensuring that only developments which require a water-oriented location are permitted along the shore. Each must be managed as integral components within the larger planning context of coastal

management. Such administrative priorities are often implemented through regulatory standards, land use designations, setbacks, area management plans, development permit conditions, and impact assessments. Once implemented, each component is an essential factor in achieving effective coastal management, rather than constituting an ultimate or final policy objective in itself.

Finally, the allocation and use of land and water resources must allow equal and adequate opportunities for participation by all affected parties. In order to facilitate effective involvement by the various agencies, publics, and industries there must be formal, mandatory avenues for citizen participation in decision making processes. Thus, equity in coastal management is a measurement of administrative fairness in processes involving the allocation of land and water resources.

The fundamental tenet of this paper is that the choice of policy instruments selected for managing coastal environments on either side of the international border should produce a comparable level of effectiveness, efficiency, and equitability for balancing environmental protection and conservation needs, with sustainable economic development. Where the analysis reveals weaknesses in either approach, recommendations are provided to improve the governance of coastal resources in that system.

First, however, it is necessary to briefly describe the institutional frameworks used for managing the Canadian and American coastal zones. The balance of the paper will focus on the consequences of these 2 different approaches as exemplified in Boundary Bay, British Columbia and Cherry Point, Washington.

COASTAL MANAGEMENT= THE CANADIAN APPROACH

Constitutional Setting

In Canada, legislative responsibility to plan and manage coastal resources within shorelands and adjacent waters is divided between the federal and provincial governments, as initially proclaimed under the British North America Act (Great Britain, 1867), and more recently, the Constitution Act (Canada, 1982). The federal government has jurisdiction over, among other things, protection and conservation of marine and inland fisheries, navigation, shipping, inter-provincial undertakings, and issues transcending international boundaries. Provincial governments have jurisdiction over property and civil rights, and matters of a local or private nature. The provinces have delegated limited land use planning authority to municipal and regional governments.

Coastal land and resource management, both inland and at the coast to the low-water mark, are generally provincial responsibilities with certain exceptions, such as federally-administered lands and resources of the northern territories, national parks, coastal harbors, and defense installations. The split between federal and provincial

jurisdiction involves several areas of overlapping responsibility leading to the need for cooperative efforts in coastal management.

In the late 1970s, the Canadian Council of Resource and Environment Ministers (CCREM) attempted to formulate a national approach to coastal management. A national conference was organized under the auspices of CCREM to address ecological, economic, and social problems resulting from the fragmented and poorly planned nature of the nation's coastal zone institutions (CCREM, 1978). In this major initiative, the council recommended several policy and planning improvements to integrate the management of the Canadian coastal zone. These guidelines were to form the basis for coastal management in areas of provincial and federal jurisdiction as each level of government felt appropriate. The measures included new institutions, impact analyses, habitat protection, information systems, public access, and citizen involvement.

Twelve years following the CCREM symposium, it is obvious that the recommendations of this national conference have been largely ignored. This does not imply that any of the problems identified have been solved by other means; rather, they have intensified. During this period, Canadian federal and provincial governments have felt content that the traditional agencies, and their customary ways of making decisions affecting coastal environments, are adequate. Yet, the quality and abundance of coastal marine and freshwater shorelines and nearshore environments are deteriorating due to rapidly increasing, and often conflicting, demands for urbanization, industrialization, and transportation.

Today, the major federal institutions involved in the management and planning of the coastal zone include: the Department of Fisheries and Oceans; Environment Canada; Energy, Mines, and Resources Canada; Transport Canada; Parks Canada; and, Public Works Canada. In all, there are 16 federal agencies responsible for at least as many acts pertaining to various land, marine, and resource interests. However, none deals exclusively with the coastal zone. A lead agency has not been empowered to coordinate federal coastal initiatives.

Similarly, there are least 15 provincial agencies, each with administrative mandates specified under different acts and regulations responsible for managing various land and marine resources. These include the ministries of crown lands, environment, agriculture and fisheries, health, transportation and highways, municipal affairs, and parks. However, there is no lead institution for promoting coastal planning among provincial agencies, or for integrating and reconciling provincial initiatives. Within municipal boundaries, most shore-area planning responsibilities are administered under zoning bylaws and building regulations. Outside municipal boundaries, provincially-owned areas are administered by the Ministry of Crown Lands, whereas privately-held properties are the responsibility of regional districts.

In recent decades, increasing demands on the coastal zone have led to severe problems. For example, widespread shellfish contamination on certain shores has resulted in harvesting closures, reduction of local food sources, and elimination of popular recreational activities. Poorly planned shore development in other areas threatens, or has destroyed, valuable wetland habitat. Excessive demands on estuarine ecosystems have adversely affected some fisheries habitat. Concurrently, inappropriate development siting has proceeded in many areas without accounting for risks inherent from coastal flooding and erosion hazards (Morgan and Secter, 1980: 715).

Neither federally nor provincially have goals, legislation, or institutions been adopted to guide British Columbia coastal resource management. This is the result of ambiguous governmental jurisdictions and a Canadian parliamentary system which avoids restraining ministerial discretion (Marshall et al., 1987). In place of an integrated approach, the responsibility to plan and manage the coastal zone is spread widely among various federal, provincial, and local agencies, each of which has jurisdiction for discrete land and water use activities (Canada and British Columbia, 1978). As a result, there is no administrative body accountable to promote an on-going integration of priorities for balancing conflicting demands and pressures on limited coastal resources.

Only in relatively few instances is there a coordinated effort among governmental agencies to formally assess environmental and social impacts of proposed coastal developments. Of greatest significance in this regard is the federal Environmental Assessment Review Process (EARP). Specifically, it requires that environmental impacts of government decisions and actions be considered early in the planning of major federal projects. Where adverse implications are possible, or where there is considerable public concern, the government agency initiating the review refers the proposal to the federal Minister of Environment for public review by an independent panel (Canada, 1986). The EARP process applies to any proposal which:

- is to be undertaken directly by an initiating federal government agency, such as Transport Canada's current bid to construct a third runway at Vancouver International Airport;
- involves federal government financial support, such as several railway relocation projects;
- may have environmental impacts on areas of federal responsibility, such as national parks; and,
- is located on lands, including the offshore, that are administered by the federal government, such as the recent expansion of the Robert's Bank Coal Terminal, located southwest of Vancouver, B.C.

However, the conduct of federal environmental assessment review processes has been limited only to a few major developments. Neither the EARP process nor a provincial equivalent are normally conducted on a routine basis to assess the biological, physical, and social impacts of most coastal developments. Similarly, comprehensive interagency review procedures involving impact assessments are generally not employed as regional resource planning strategies when allocating land and water uses.

Estuaries

To say that coastal management does not exist at all in British Columbia would be incorrect Interagency task forces have been established for selected estuaries and harbors, including the Fraser, Squamish, and Cowichan rivers (Secter et al., 1987). Each was created in response to the need for an integrated management strategy to rationalize the present mix of activities, and to guide decision making and planning for future uses. The most ambitious of these is the Fraser River Estuary Management Program (FREMP), which involves more than 60 government agencies and interest groups. However, progress has been difficult and slow in this endeavor during the 12 years since its inception for at least 2 fundamental reasons:

1. participation among the members is voluntary; and

2. limited funding has restricted the availability of personnel needed to plan, conduct research and consult with the public prior to land and water allocation decisions (Secter et al., 1987).

The program resulted from negotiations between British Columbia and a now-defunct federal coastal zone coordinator in the early 1970s. This experience was intended as a model for subsequent regional coastal programs using the 1978 CCREM guidelines and principles. However, since the coastal coordinator's position was abolished in 1981, the FREMP model has not been applied elsewhere in Canada. Nevertheless, FREMP has the potential to achieve the most rigorous level of intergovernmental coordination of any coastal management initiative in the province to date.

The Islands Trust

Among the most successful regional coastal management experiences in British Columbia is the Islands Trust. Established by the provincial government in 1974, and legislated in 1990, the trust is governed by.3 provincially-appointed and 26-elected local trustees. It's mandate is to preserve and protect the amenities and environment of 13 major and 450 smaller islands in the Gulf of Georgia, in cooperation with the municipalities and the provincial government. After 15 years of existence, residents strongly support this institution and wish to see its role maintained or expanded (M'Gonigle et al., 1987). However, the public has been dissatisfied with the trust's

performance in areas of subdivision control, forest management, aquaculture regulation, sewage disposal, and water use (M'Gonigle et al., 1987). It is precisely in these areas that the trust has limited or no jurisdiction. Yet, this experience in regional coastal management is worthy of strengthened regulatory powers and possible emulation throughout the settled coastal regions of British Columbia.

Meanwhile, our neighbors to the south have taken a more highly-structured regulatory stance to managing their coastlines. Due to similar, and perhaps more intense problems resulting from development and land use pressures in sensitive habitats, on coastal bluffs, or in areas which have alienated public use of shorelines, the American federal government created an integrated, legislative framework to balance conflicting demands in the coastal zone. The American experience with coastal management under this regulatory regime is described briefly below.

COASTAL ZONE MANAGEMENT: THE AMERICAN EXPERIENCE

Federal Role

In 1972, the United States Congress enacted the Coastal Zone Management Act (CZMA) because of the need for increased protection of the natural, biological, and physical resources of the coast (Chasis, 1985: 21). Based on a coordinated federal-state partnership, it established a coastal management agenda which encouraged states to address the purposes of the national program. The act emphasized the need to protect important ecological, cultural, historical, and esthetic values of the coastal zone (U.S., 1982: s.1452(2)), recognizing that living marine resources, wildlife, wetlands, and open spaces had been seriously impaired by development pressures and threatened by burgeoning shoreline development (U.S., 1982: s.1451(c)).

Congress declared 4 national policies in the act (U.S., 1982: s.1452(1)-(4)). These include: (1) to preserve, protect, develop, and restore coastal resources; (2) to assist states in developing and implementing programs which meet specified national standards; (3) to encourage special management plans that protect nationally-significant natural resources and improve protection of life and property in hazardous areas while ensuring reasonable coastal-dependent economic growth; and, (4) to encourage local, state, and federal agencies to develop public participation programs for achieving the purposes of the act. In addition, states with approved or developing programs were made eligible for grants and loans from the Coastal Energy Impact Fund to help mitigate adverse impacts from coastal energy developments (U.S., 1982: s. 1456a).

The National Oceanic and Atmospheric Administration (NOAA), within the Department of Commerce, is the lead agency charged with managingthe program (Chasis, 1985: 26). NOAA is responsible to ensure that state coastal zone management plans conform with criteria specified in the act. NOAA periodically evaluates state program

performance, and has authority to withhold federal funds and withdraw federal approval if states fail to meet national standards (U.S., 1982: s. 1458). All changes to state programs must be approved by the secretary of commerce (U.S., 1982: s. 1455(g)).

Further, the federal government assumes legal responsibility to ensure that federal activities directly affecting the coastal zone are consistent with state programs (U.S., 1982: s. 1456(c)(l)). To meet this objective, the federal government normally does not issue permits for activities affecting coastal resources and uses that are inconsistent with state coastal management policies, unless federal interests such as national defense require it to do so.

The federal Coastal Zone Management Act is supported by the National Environmental Policy Act (NEPA). While NEPA is not specifically designed to provide a mandate for administering the coastal zone, it provides broad pervasive authority to enhance environmental protection. This law is distinctive in that it takes precedence over all other federal legislation and programs (Washington, 1988a). The principle purpose of NEPA is to identify and mitigate adverse environmental impacts which may be caused by proposed projects or activities under federal regulation. This is facilitated through the requirement for mandatory environmental impact statements (EISs) prior to developments being permitted, licensed, or approved. Draft and final EISs are distributed widely by the federal agency initiating, preparing, or coordinating the review to all interested agencies, industries, and public groups. Concerns and issues are then transmitted back to the lead federal agency coordinating the assessment. Through this process, activities and projects under federal jurisdiction are subject to onerous, integrated reviews to minimize environmental and social impacts, and to propose feasible mitigation plans. Proposed developments, activities, or land use plans which fail to address anticipated impacts and public concerns, or which do not meet the protection policies established in NEPA, can be denied. Thus, potentially irrevocable decisions are minimized in, among other areas, the coastal zone through the sweeping authority vested in NEPA.

State Role

Prior to the 1972 CZMA, only a few states were developing comprehensive coastal management plans, while many others had passed legislation for regulating specific coastal zone uses. Most states had delegated substantial authority to local governments, retaining little control over the conservation and protection of statewide coastal resources. The result was an indiscriminate array of local area development policies and priorities with little concept of regional planning (Hildreth and Johnson, 1985).

The CZMA was designed to encourage federal, state, and local agencies to adopt more rational land-, water-, and resource-allocation procedures based on an integrated **hierarchy of governmental policies** and responsibilities. Congress specified that, at a **minimum,** states must:

- protect fish, wildlife, and natural wetland resources;
- **minimize** loss of life and property **from** coastal hazards;
- **establish guidelines** for siting major energy, fisheries, recreation, ports, **and** transportation facilities;
- assure that local regulations do not restrict public access **and** recreation;
- redevelop urban waterfronts and ports;
- preserve and restore historic, cultural, and **esthetic** coastal features;
- **consult and** coordinate actions with federal agencies;
- **encourage** public and local government participation in coastal management decision making; and,
- establish comprehensive conservation and management plans for living marine resources, and siting of pollution control and aquaculture facilities (U.S., 1982: s. 1452(2)(A)-(I)).

Since the **mid-1970s,** most states have enacted comprehensive coastal zone legislation. For example, the Washington State Coastal Zone Management Program was initiated a year prior to the enactment of the federal CZMA under the 1971 Shoreline Management Act. Because the objectives of this act were consistent with the federal law, Washington became the first state in the nation to have a federally-approved coastal management program (Washington, 1976). The Washington State Coastal Zone Management Program is administered by the Department of Ecology.

As at the federal level, Washington state has adopted legislation requiring that environmental impact statements be conducted to assess physical, biological, and social implications from proposed projects, activities, and land use plans under state jurisdiction. This power is enshrined in the State Environmental Policy Act (SEPA) of 1971 (Washington, 1971) which contains comparable policies and directives as the federal NEPA. SEPA is the state's strongest statement of a comprehensive environmental policy, declaring that "... each person has a fundamental and inalienable right to a healthful environment and that each person has a responsibility to contribute to the preservation and enhancement of the environment" (Washington, 1971: RCW **43.21C.020(3)).** This proclamation gives private citizens standing to challenge actions and decisions of state and local agencies which could have adverse environmental **impacts.**

Further, **SEPA is** applicable not only to projects, but to a variety of other kinds of governmental actions as well. It was used, for example, in the formulation of the environmental impact statement for the Gray's Harbor Estuary Management Plan which was distributed widely to the state governor, Department of Ecology, Ecological

Commission, other local, state, and federal regulatory agencies, port districts, industries, public interest groups, and private citizens.

In an effort to avoid duplication in the preparation and review of environmental impact statements, SEPA is not required when adequate detailed assessments are prepared pursuant to the National Environmental Policy Act of 1969. In these cases, the NEPA environmental impact statements may be utilized in lieu of separately prepared assessments under SEPA (Washington, 1971: RCW 43.21C.030(2)(c)).

The burden of compliance with SEPA's impact statement requirements rests with the regulatory agency with the most comprehensive authority over a given proposal or action. In the case of proposals by state authorities, the initiating agency plays a lead role. Conversely, the identification of an accountable governmental department is more difficult to determine when private proposals are considered which may require approval from several agencies. However, the thrust of the SEPA regulatory procedures and guidelines is to identify the city or county with jurisdiction over the area in which the action is proposed as the lead agency. Thus, SEPA is of central importance to all approval processes in Washington state, including those operative in the coastal zone. When used as intended, it provides a solid informational base for public decision making.

Local Role

Since 1976, 29 state and territorial coastal management programs have been approved by the federal government throughout the United States (McGilvray, 1987). Congress gave the states a high degree of flexibility to address coastal issues in their own way. Local governments are often required to prepare detailed land and water use plans to guide the protection, conservation, and development of coastal resources, based on mandatory statewide goals. Each state program differs from the others, however, particularly in the way local governments are involved in the program implementation process. In some states, local governments are not involved formally in coastal zone program decisions; in others, much of the responsibility is delegated to the local level. For example, cities, counties, and port districts in Washington play a lead role in coastal program implementation, and have authority to control development and ensure projects comply with state and federal requirements. However, the state government retains responsibility for regulating local decisions, and overturning or appealing them if necessary (McGilvray, 1987: 2779; Chasis, 1985: 26).

SUMMARY ASSESSMENT OF CANADIAN AND AMERICAN COASTAL ZONE INSTITUTIONS

British Columbia has diverse coastal and oceanic resources which are the envy of the world. Yet, there have been a continuing series of conflicts and confrontations related to resource allocation and ownership that should have been capable of resolution using routine regulatory procedures. In spite of over 30 federal and provincial agencies responsible for administering discrete coastal resources, none have exclusive control to balance conflicting economic development policies, nor to reconcile their mandates with conservation and preservation needs. As a result, there are no procedures, standards, or regulations to prevent urban, commercial, and industrial developments from locating in sensitive coastal areas such as wetlands, **floodplains, or on marine bluffs.**

Environmental impact assessments are seldom conducted to justify proposed coastal developments, and generally not employed as regional resource planning mechanisms to decide on most appropriate land and water uses. This is partially due to the lack of legislative requirements for such processes. As a result, the conduct of such studies has generally been limited only to a few large-scale projects which, due to their controversial nature and public profile, makes some kind of formal review of environmental and social impacts politically necessary.

In comparison, American governments have adopted a systematic approach to manage their coastal environment. Federal, state, and local legislation includes several essential components for integrated land and water management. Among others, these include: integration of agency roles and responsibilities; political commitment through legislated mandates; mandatory public involvement in all planning phases; mitigation and compensation strategies to minimize short- and long-term impacts; periodic review, assessment, and amendments of local land and water use plans; interagency negotiation and bargaining mechanisms to reconcile conflicting demands and pressures; and, public **hearings** to adjudicate various interests and concerns on proposed coastal zone uses. In British Columbia, such principles are poorly developed due to the absence of comprehensive coastal management legislation and institutional arrangements, which should be endorsed by broader provincial and national environmental policies.

The American approach to coastal management is supported by parallel state and federal environmental legislation. The National Environmental Policy Act, and in the state of Washington, the State Environmental Policy Act, have wide-sweeping powers; these laws require mandatory environmental impact statements which are administered by designated lead regulatory agencies to ensure their proper distribution and review. Further, such legislation is used not only for the approval process of major projects, but for any actions or land use plans which could significantly affect environmental quality.

The consequences, or outcomes, of these 2 approaches to coastal management will now be evaluated by comparatively examining the Boundary Bay, British Columbia and Cherry Point, Washington case studies. This analysis investigates whether the same objectives of reducing or minimizing land, water, and resource use conflicts are achieved as effectively, efficiently, and equitably under the Canadian system, as compared to the American. From this international case study comparison of opposing approaches to manage the Boundary Bay and Cherry Point marine environments, recommendations are suggested to improve the British Columbia system.

CASE STUDY ANALYSIS: BOUNDARY BAY, BRITISH COLUMBIA AND CHERRY POINT, WASHINGTON

Physical Setting: Boundary Bay

Boundary Bay is approximately 20-kilometers south of Vancouver, bounded by the municipalities of Surrey, White Rock, and Delta (fig. 2). This estuarine area includes beaches, wetlands, wildlife habitat, salt marshes, spits, and coastal bluffs. Including Mud and Semiahmoo bays, Boundary Bay encompasses over 6000 hectares of tidal flats and saltwater, and at least as much area landward of the dikes to the extent of coastal-related influences (Gamble, 1989). Resource uses and pressures from transportation corridors, agricultural activities, and residential and commercial developments have seriously altered, and continue to threaten, natural processes and values of the area_ For example, a major commercial oyster harvesting resource was lost in 1962 due to pollutants from rural and urban stormwater runoff (B.C., 1988b). Public access and esthetics are impaired by the Burlington Northern Railway (BNR), which dominates the entire shoreline from Mud Bay to the international border, and by high-density residential and commercial developments along the White Rock coastal bluffs. As a result, there is a limited area of parks, open spaces, and trails to serve the local population.

Physical Setting: Cherry Point

Located approximately 15-kilometers south of Boundary Bay, the Washington state study area is considerably smaller, both in terms of area and regional environmental significance (fig 3). Despite recent proposals for major port, cargo-handling, and industrial facilities, the Cherry Point coastal zone is not subject to a multitude of resource conflicts and inappropriate developments (Gamble, 1989). In fact, it was such pressures that spurred the Whatcom County Planning Department, in -cooperation with the state Department of Ecology, to adopt development siting policies, regulations, and standards to protect the ecological values of the Cherry Point coastal zone, and to prevent economic losses from flooding and erosion. These agencies coordinated the interests of all regulatory departments and the public, and provided comprehensive mandatory guidelines for industrial development. The purpose of the Cherry Point Industrial Management Unit:

Figure 2. Boundary Bay, British Columbia.

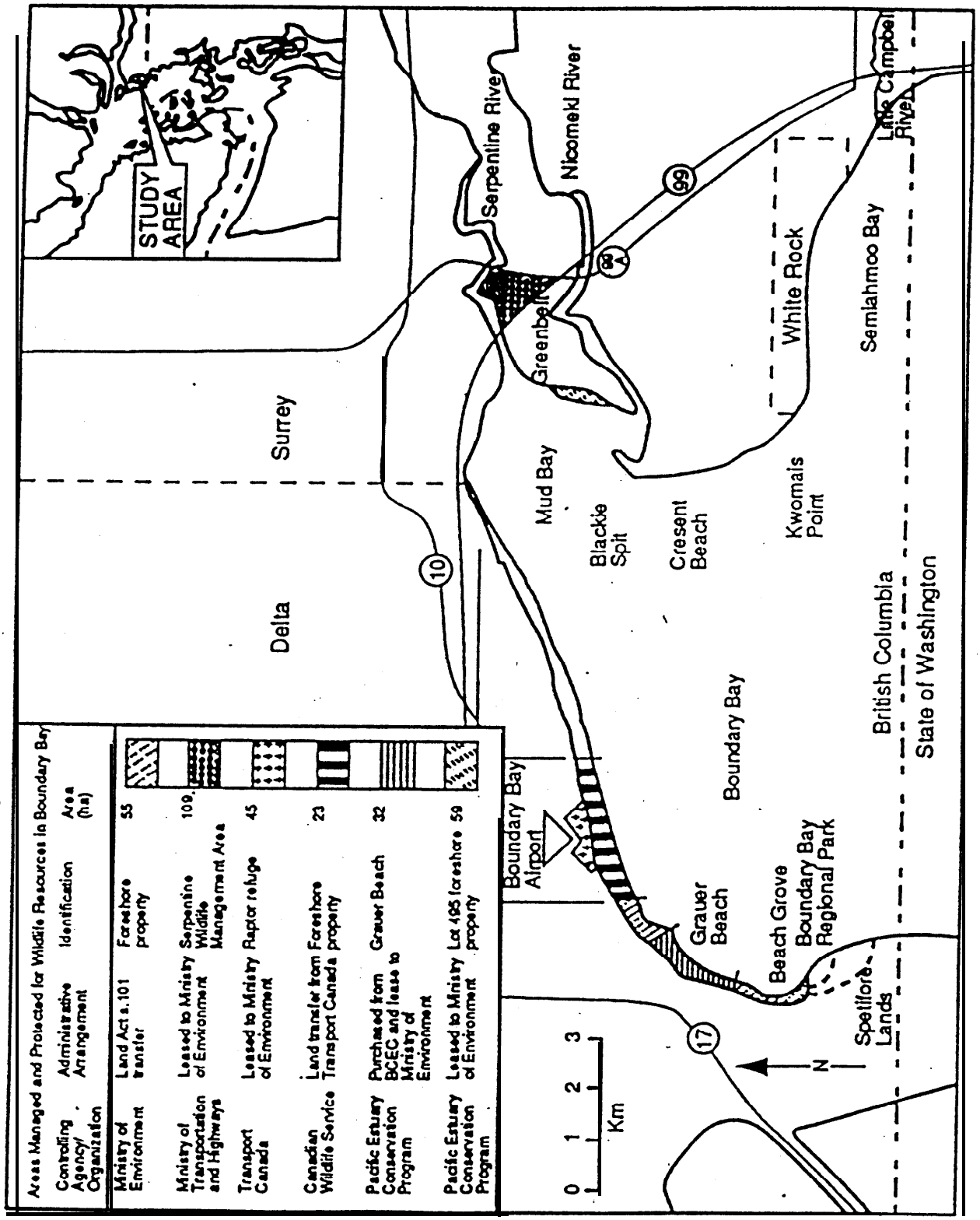
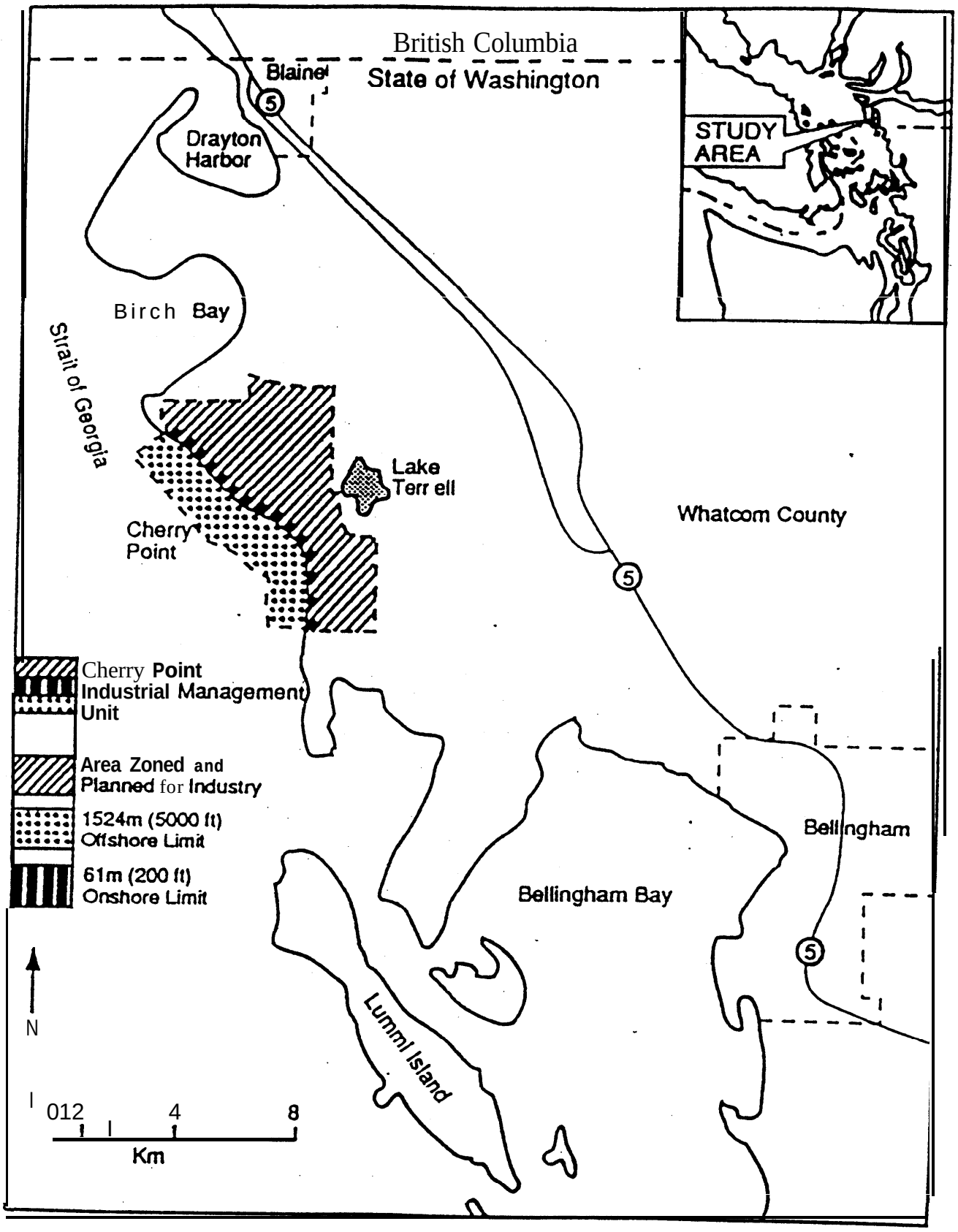


Figure 3. Cherry Point Industrial Management Unit, Washington.



> . . . is to provide a regulatory environment which ... balances the special port, industrial and natural resource needs associated with the development of this marine resource along a shoreline of statewide significance ... [and] . . . identif[y] preferred development components of port and shore-dependent industrial activities consistent with the policies of the Shoreline Management Act, ... [which] ... clearly set forth standards for such development (Whatcom County, 1986: s.6.21.2).

The key to this innovative approach to coastal zone management is the routine use of focused environmental impact assessments as regional planning mechanisms to evaluate the need, and prescribe siting criteria, for proposed industrial developments. To ensure an efficient process, the Whatcom County Shoreline Management Program regulations provide industry with clear and consistent policy direction for development siting priorities, and required mitigative and compensatory measures to minimize impacts to water quality, fish and wildlife habitats, public access, esthetics, and from natural hazards. Agencies and the public are then able to respond in a timely manner for early acceptance of beneficial proposals, or rejection of detrimental ones.

The objective of the Whatcom County impact assessment procedures is to achieve long-term ecological sustainability while accommodating needed economic growth. To do so, the limitations or constraints imposed by the physical environment are incorporated into the development siting criteria as standards, regulations, protective designations, and setbacks. These parameters represent the minimum substantive content of the environmental impact assessment requirements. They are legally-binding rather than discretionary. As a result, the regulatory framework provided has been able to prevent the piecemeal and uncontrolled degradation of the Cherry Point coastal zone. Although the physical and social environmental values of Cherry Point are not as regionally or internationally significant as in Boundary Bay, they are recognized as worth protecting by the regulatory agencies.

Water Quality: Boundary Bay

Programs have recently been initiated by the British Columbia Ministry of Environment to establish water quality objectives and coordinated monitoring strategies for selected estuaries and water bodies throughout the province. In Boundary Bay, these efforts are supported by the agencies participating in the Fraser River Estuary Management Program (FREMP).

Enforcement. Although these objectives are not legally enforceable standards, they are used by the provincial waste and water management branches as guidelines when issuing permits, licenses, and approvals to dischargers of point-source pollution (B.C., 1988b: 7). However, since activities such as agricultural operations in the Boundary Bay

coastal upland do not require waste effluent permits, the water quality objectives for the area may never be achieved as ambient levels. This is because there are no regulations or procedural requirements to minimize coliform contamination from farmland drainage, or to prescribe acceptable fertilizer application rates. Additionally, neither federal, provincial, nor regional agencies regulate or monitor nonpoint-source pollutants in stormwater runoff to Boundary Bay. Consequently, the implications of deleterious substances discharging into the bay are not fully measured or understood Without knowing the quality and quantity of the source of pollutants, it is difficult for the agencies to require corrective action As a result, a major weakness in the British Columbia approach to water quality management is the inadequate regulation of various activities which collectively destroyed a once-valued commercial shellfish industry over a quarter-century ago.

Regional and Provincial *Monitoring* Most water quality monitoring efforts within the Boundary Bay coastal zone focus on the Serpentine, Nicomekl, and Little Campbell rivers, rather than the receiving marine environment. The British Columbia Ministry of Environment annually monitors water chemistry only at 2 locations in the entire Boundary Bay area (Canada and B.C., 1987). The provincial Ministry of Health and the Greater Vancouver Regional District each measure bacteriological contamination on various bathing beaches during summer months. Meanwhile, there are 11 sites in the 3 small tributaries and related creeks for which a full range of water quality parameters are regularly sampled and analyzed. This reflects an assumption that if pollutants are measured and controlled at their sources, there should be no need to monitor subtle downstream impacts to the marine environment, or to quantify receiving marine water quality changes. However, there are numerous locations, sources, and characteristics of pollutants entering the bay. As well, the dispersion and dilution rates associated with waste discharges from agricultural, commercial, and residential sources are poorly understood. Therefore, a more representative and comprehensive water quality assessment of Boundary Bay would require an increased number of marine monitoring sites, and frequency of studies to fully evaluate the range of chemical and bacteriological parameters.

It does not appear that the sampling programs of the provincial and regional agencies are coordinated because of differences in timing, locations, study purposes, sampling parameters, and reporting procedures. In fact, there does not appear to be a concerted attempt by the agencies to restore the commercial shellfish industry within Boundary Bay, as once suggested by the provincial Water Management Branch (B.C., 1988b: 8). Fortunately, through the recent efforts of the -Standing Committee on the Fraser River Estuary Water Quality Plan, a centrally-administered water quality data collection and dissemination program for Boundary Bay and adjoining tributaries is now in place (Canada and B.C., 1987). However, it remains to be seen how seriously the program administrators will use and distribute this information to enforce existing water quality legislation and require corrective action by responsible parties.

Federal Monitoring Both Environment Canada and the Department of Fisheries and Oceans have marine environmental quality mandates under the federal Fisheries Act and the Canada Water Act (Gamble, 1989). However, neither agency regularly monitors water quality in Boundary Bay to identify problems or prescribe remedial land and water management practices. Rather, the federal role is limited to a reactive approach to catastrophic pollution occurrences, instead of proactively establishing standards and implementing programs to reduce sublethal, but cumulative, loadings of contaminants into the marine environment.

Neither federal nor provincial agencies are taking the initiative to coordinate efforts to increase the data and knowledge associated with such concerns as: assimilative capacity of marine waters; effects of contaminants on marine life; sedimentation rates; water movements; salt water intrusion in the tributaries; and, quality and volume of nonpoint discharges. From the provincial perspective, most of these problems are considered to be federal responsibilities (Gamble, 1989). Federally, however, they are not given high political priorities. This is aggravated by the fact that the federal government does not endorse the provincial attempt to formulate basin-specific guidelines, nor is it taking rigorous action to establish enforceable national water quality standards. Opportunities to improve provisional water quality objectives and monitoring programs are limited due to the absence of common federal-provincial interests, priorities, and resource funding. A reallocation of existing federal funds away from such areas as national defense, and a larger provincial commitment to enforce existing legislation, is urgently needed to improve marine environmental quality in support of effective coastal zone management.

Water Quality: Cherry Point

Water quality management along the Whatcom County shoreline is an integral component of a much larger federal-state endeavor by the Puget Sound Water Quality Authority (PSWQA).

The Monitoring. PSWQA recently established a monitoring management committee represented by local, state, and federal agencies. Its purpose is to implement a comprehensive strategy to integrate ambient and discharge water quality monitoring and to conduct sediment, habitat, and biological quality assessments in the sound (Washington, 1988b). The participating agencies, universities, tribes, industries, and members of the public are responsible for: conducting monitoring programs; maintaining inhouse data bases; preparing annual or biennial reports complete with data listings, analytical results, and interpretative summaries; and, recommending ways of improving the monitoring program. As well, each agency publishes and distributes nontechnical versions of their findings to the public (Gamble, 1989). As a result, regulatory agencies, industries, research communities, and the general public are kept informed of requirements and expectations for effective marine environmental quality in the sound. Activities which affect the region are regulated in a coordinated and planned manner.

Funding. Recently, the Washington state legislature committed **$2.7-million** from general taxes **toward the program, in addition to $500,000 from funds within the Department of Ecology** for the 19884989 **biennium (Washington, 1988b: 77). These 2 sources approached the $3.33-million requested by PSWQA. The authority also applied for additional long-term federal funding to further support continuation of state water quality management efforts in Puget Sound (Washington, 1988a: 1).**

This level of joint-funding by American federal and state agencies differs significantly from the British Columbia approach to water quality management. Neither national marine quality management areas nor federal standards have been established, although such actions are **possible under existing Canadian legislation. The few water** quality **objectives** and criteria which exist throughout the province **have been unilaterally** funded and developed by the provincial Ministry of Environment. Although the provincial initiative appears more promising than the federal one, marine environmental quality management is a responsibility of both levels. It should be funded jointly, even at the expense of reallocating or redirecting financial resources from other priorities. This would allow monitoring efforts to be more comprehensive and rigorous, enabling the authorities to regulate currently-ignored water quality parameters.

Public Involvement. The PSWQA implements programs to **revitalize** and protect the sound using volunteer public support. It **recognizes** that pollution prevention requires an ongoing commitment from informed, involved publics. Programs include participation by highly-organ&d citizen groups and individuals with specific interests. Because these programs require people who are educated about the issues, local field agents work with the public to develop necessary technical skills. **Recognized** benefits of active citizen participation provide: 1) an increased sense of management responsibility and pride among those using the resources of the sound; 2) an intrinsic source of knowledge, expertise, values, priorities, and support to decision makers; and, 3) more efficient use of available funds and personnel through reduced agency workloads.

In comparison, the British Columbia approach to inform the public of water quality problems in Boundary Bay is limited to infrequent meetings, newsletters, and workshops sponsored by the Fraser River Estuary Management Program, Clearly, the potential benefits of involved, informed publics are not being fully **realized.**

Ecological Protection: Boundary Bay

Over the past 125 years, the marshes, wet **meadows, bogs, and wooden habitats of the Fraser River delta have been virtually lost to urban and industrial development (Canada, 1987:** 18). Boundary Bay sustains the single most important estuarine habitat in this region, supporting the largest population of wintering waterfowl in **Canada.** It is the last remaining wildlife refuge in an ecologically diminished environment which is

continually threatened by expanding urban and industrial developments. However, in spite of its outstanding regional and national significance, Boundary Bay is not presently managed by protective legal designations or regulatory development guidelines. Consequently, land, water, and resource allocations tend to be based on economically-driven principles, with virtually no consideration to long-term ecological sustainability.

The implications of this are clear. In 1988, the provincial government proposed to remove farmlands from greenbelt protection between the Serpentine and Nicomekl rivers to enable their purchase and subsequent development for residential and commercial ventures (B.C., 1988a). If this proposal is implemented, there is no guarantee of protection or compensation to the existing, and already threatened, wildlife and habitat resources. Indeed, this area, including Mud Bay, has been the focus of considerable public pressure for a waterfowl sanctuary with access and viewing opportunities for nearly a decade (Fraser Valley Wetlands Habitat Committee, 1980a and 1980b; Leach, 1982, 1987a, 1987b, 1988; Lower Fraser Wetlands Committee, 1988). Despite the ecological uniqueness and widespread concern for the need to protect Boundary Bay and related uplands, current administrative systems have allowed the insidious destruction of an already limited coastal land and water ecological resource base.

Recent controversies over the highest and best use of the land area surrounding Boundary Bay indicate that the agricultural industry is also threatened. Farms are being bought out by property investors, speculators, and developers in south Delta in a bid to capitalize on some of British Columbia's finest remaining agricultural land (Pynn, 1990). An inventory of 2700 hectares fronting Boundary Bay shows that private companies, several of them owned by lower mainland realtors or foreign investors, hold more farmland than do bona fide farmers (Pynn, 1990). Clearly, speculators will have a destabilizing effect on agriculture, which in turn will reduce the quantity and quality of available ecological habitat. Many farms which lay fallow in the winter serve as valuable wintering and breeding habitat for migratory waterfowl, shorebirds, and raptors. These are now being lost at a significant rate to urban developments and golf courses.

Of the Boundary Bay agricultural land still owned by farmers, much is already optioned for golf course development, including the $70-million Domoch Dunes. This 216-hectare project, backed by Canadian Forest Products Ltd. chief executive officer Peter Bentley and B.C. Gas Inc. chairman Ronald Cliff, includes provisions for a 36-hole golf course (Pynn, 1990). The issue is that golf courses, which largely lay unused in the sensitive winter and early spring months, do not yield productive habitat as do fallow agricultural fields.

The lack of government support for the Agricultural Land Commission is leading to property speculation, which in turn is having impacts on the viability of a diminishing ecological resource. This downward spiral in the utilization of good farmland will be

catastrophic to the millions of shorebirds, waterfowl, and raptors which use the estuary. This is the result of the lack of a comprehensive coastal zone policy and political will.

Order-in-Council 908. The only protective mechanism in place to prevent potentially harmful developments in Boundary Bay from totally eliminating fish and wildlife habitat is a cabinet directive under the Environment and Land Use Act, administered by the Ministry of Environment (B.C., 1977). Order-in-Council 908 requires mandatory environmental impact assessments for all proposed developments seaward of the Boundary Bay dikes (B.C., 1977). However, while this reserve draws attention to the important biological integrity of Boundary Bay, it is not a formal land use designation. Orders-in-council can be overturned, canceled, or amended by other cabinet directives. Thus, while this regulation offers some degree of ecological protection seaward of the dikes from inappropriate developments through an assessment and review process, it does not assure a long-term guarantee to the sustainability of fish and wildlife populations in the Boundary Bay coastal zone, nor does it garnish any protection to the upland.

Ramsar Designation Federal attempts have been made to protect the wildlife values of Boundary Bay. The Canadian Wildlife Service (CWS) has demonstrated that Boundary Bay exceeds the requirements for classification as a Ramsar site of international wetland significance (Canada, 1987). Under the terms of the Ramsar convention, a wetland is considered internationally important if it regularly supports significant numbers or percentages of waterfowl and shorebirds, and provides habitat to several rare, vulnerable, or endangered species of plants or animals.

During peak migration, up to 1.4-million birds use the Fraser River delta; within Boundary Bay, estimates of the maximum number of waterfowl exceed the criteria for internationally important wetland status by over 13 times, and shorebirds by 40 times (Canada, 1987). Nevertheless, the British Columbia provincial government has not acknowledged nor approved a CWS request to apply for Ramsar designation (Skelly, 1988). In particular, the provincial government has vetoed this attempt because of the unwanted international attention it would receive due to its preference for economic development in ecologically-sensitive habitat.

In the absence of enforceable standards or comprehensive planning regulations for Boundary Bay, there have been various federal, provincial, and private efforts to secure pockets of land and water for fish and wildlife protection (fig. 2). To date,, less than 3 percent, or only 323 hectares, of land and water have been reserved for fish and wildlife protection. Of this, only the 109-hectare Serpentine Wildlife Management Area is protected by a legal designation with mandatory conservation-oriented goals and objectives. In view of the substantial land and water area which the Boundary Bay coastal zone encompasses, and given its renown international significance, this amount of protected habitat is totally inadequate.

In an effort to arrest and reverse these and other losses throughout the province, the Pacific Estuary Conservation Program (PECP) was adopted in 1986 to acquire, protect, and rehabilitate fish and wildlife habitat. Funded and managed jointly by The Nature Trust of British Columbia, Ducks Unlimited, Wildlife Habitat Canada, and the Ministry of Environment, PECP has purchased some 575 hectares of privately-owned lands on foreshore mudflats throughout the province, including 32 hectares in Boundary Bay. The Ministry of Environment assumes management responsibilities and costs on lands acquired by the program through 99-year lease arrangements. To date, PECP has initiated transfer of administrative title of 500 hectares of adjacent intertidal public lands from the Ministry of Crown Lands to the Ministry of Environment under section 101 of the British Columbia Land Act (Jones, 1990). Currently, an application has been made for the transfer of 6500 hectares of intertidal habitat in Boundary Bay from the Ministry of Crown Lands to the Ministry of Environment.

Another important initiative involves a cooperative waterfowl management plan for British Columbia. The Canadian Wildlife Service, the Wildlife Branch of the B.C. Ministry of the Environment, and Ducks Unlimited have identified 59,000 hectares of coastal wetland and additional upland habitats, including Boundary Bay, which they estimate are required to preserve 70% of waterfowl populations which existed in the 1970s (Canada et al., 1989). Currently, efforts are underway-to priorize the habitat needs throughout the coast as less than one-third of this land has been secured. However, a major problem is that much of the land required for wildlife habitat protection is forced to compete with economic development opportunities. Due to high land aquisition costs and forgone revenue benefits with reserving large tracts of land for wildlife management, it is doubtful that the entire 59,000 hectares identified in the waterfowl management plan will be secured. The preservation and management of ecological habitats in the British Columbia coastal zone is seldom given serious, or even equal, priority consideration with other land and water uses.

Recently, a joint interagency study has been proposed to identify and evaluate the natural resources and activities in Boundary Bay (anonymous, 1989). Participants in the study include the: Canadian Wildlife Service; Greater Vancouver Regional District; municipalities of Delta and Surrey; provincial ministries of environment, agriculture and fisheries, tourism, crown lands; and, the Agricultural Land Commission (anonymous, 1989). The objectives of the study are to:

- maintain viable ecosystems capable of supporting existing populations of birds and other wildlife in the municipalities and adjoining waters;

- identify a number of locations where appropriate land and water uses can be considered, subject to the principle of sustainable development;

- maintain a viable agricultural community in the Boundary Bay area and the western portion of the Fraser Valley;

- provide opportunities for tourism and passive recreation activities;

- maintain an acceptable mix of agricultural lands, open space, wildlife habitat,. and public access; and,

- provide a management plan which enhances and maintains infrastructure services, such as flood protection, drainage, irrigation, and sewage disposal in the Boundary Bay area.

While the current proposal is commendable and indicative of serious political reform, there are several concerns about the program which deserve mention. First, neither the study management committee, nor the study steering committee conducting the assessment is represented by nongovernment organizations. Second, the terms-of-reference for the study are limited to maintaining existing bird and wildlife populations, rather than reviving or restoring populations which have declined. Third, the City of White Rock is excluded from the study management and steering committees. Fourth it is proposed that the study will require a minimum of 2 years to complete, costing approximately $2 million,

Given the long-standing efforts which have already been invested to secure wildlife protection in Boundary Bay by groups such as the Lower Fraser Valley Wetlands Habitat Committee, it is doubtful that another 2-3 years of study and an expenditure of $2 million will offer any wider options than are evident now. The primary objectives for wildlife conservation, agriculture, fisheries, recreation, and tourism management will continue to be to: (1) focus government efforts on securing crown intertidal and greenbelt lands; (2) acquire adjacent privately-held lands; and, (3) establish an institutional structure and method of meeting problems of conservation and sustainable use for wildlife resources. In short, the conservation of Boundary and Mud bays, and adjacent intertidal lands, should be planned and implemented in a period of months rather than years. Further, the millions of dollars proposed for the study could more effectively be used for land acquisitions where private land holdings offer opportunities for viable conservation and wildlife management.

Ecological Protection: Cherry Point

The most ecologically sensitive areas in the Whatcom County case study have been identified and reserved from development. Dredging, filling, and other construction activities are prohibited in federallydesignated herring spawning areas between Sandy Point and Birch Bay, and in the accretion shoreform and natural wetlands within the Cherry Point coastal zone. It is hard to assess whether enough land and water has been secured for fish, shellfish, and wildlife protection in the Cherry Point Industrial

Management Unit. However, because the most sensitive and critical areas have been identified and are protected, opportunities to entertain conflicting development options are not considered, thus preventing the piecemeal erosion of a limited coastal resource base.

The Washington approach **to manage coastal ecological resources has been more** effective than British Columbia's due mainly to 2 major administrative mechanisms. First, applicants are required by law to conduct **environmental impact** assessments **to justify** proposed projects, and to identify potential impacts **and mitigative** design **measures** for reducing impairments to the natural resources of the Cherry Point coastal zone (Whatcom County, 1986: **s.6.21.4.C(1)a).** With the Whatcom County Planning Department acting as a clearinghouse and central project registry, other regulatory agencies must review and assess each phase of such studies regarding: the legitimacy of the party or consultant preparing the environmental impact statement; study scope and design; evaluative parameters; validity of findings; and, appropriateness of conclusions and recommendations (Whatcom County, 1986: **s.6.21.4.C(1)a).** Thus, when developments are considered, all participating agencies-federal, state, and local-have opportunities to communicate with developers and landowners concerning appropriate land and water uses and mitigative programs. This process ensures that proposed developments meet approved planning standards and regulations.

By comparison, a full assessment of environmental impacts is seldom given serious consideration for most land and water use decisions in British Columbia, other than on major project reviews. In areas where there has been strong development pressure, regulatory planning has proceeded on an ad hoc and as-needed basis (Marshall et al., 1987: 3054). As a result, opportunities to require, educate, and encourage developers to **minimize** potential impacts on ecological resources are limited. This is because the disposition of public crown lands in British Columbia is ultimately based on the "highest and best use" principle, rather than on an objective evaluation of all physical, biological, economic, and social concerns.

In a recent independent study to assess administrative fairness of the regulatory process for the British Columbia aquaculture industry, the provincial ombudsman attacked the "highest and best use" concept, suggesting it should be abandoned for sound integrated resource management criteria.

> "Highest and best use" most often is equated with maximum economic yield, and may therefore conflict with values advanced by other **[m]inistries…,** conservationists, environmentalists, tourism and recreational interests, or Native Indian bands (B.C., **1988c:** 100).

The conclusions of the aquaculture study parallel those here, in that the "highest and best use" principle is not necessarily the most appropriate criterion to judge optimum land and

water uses, nor to establish priorities from which final decisions are made. This is because highest uses may not always equate with best uses.

In light of Boundary Bay's important upland and marine ecological values, all proposed coastal developments should be subject to mandatory environmental impact assessments, similar to those used in the Cherry Point Industrial Management Unit. This would increase the likelihood that potential impacts of proposed developments could be foreseen, and appropriate mitigative action taken subject to their approval. Mandatory interagency and public review procedures would also assist regulatory agencies to identify and evaluate ecological values of the area when considering development opportunities and when issuing construction permits.

The second major distinction to manage coastal ecological resources in Washington is the statewide ranking and preservation of wetlands and sensitive shore accretion landforms (Gamble, 1989). To assist in funding this program, local counties enter into cost-sharing arrangements with the state. Although a similar program has been attempted by federal and provincial wildlife institutions in British Columbia, it is not being aggressively implemented due to lack of financial and political commitment, and conflicting economic development priorities from among the myriad of government agencies. Clearly, the absence of a lead institution to ensure the timely acquisition and designation of valuable fish and wildlife habitat, in light of development pressures, is urgently needed.

Public Access and Esthetics: Boundary Bay

A wide range of coastal features, including beaches, wetlands, wildlife habitat, salt marshes, spits, and bluffs are found in the Boundary Bay coastal zone. Nowhere else in the lower mainland is there a diversity of shoreline components which accommodate a range of consumptive and nonconsumptive recreational uses. Yet, there have been a series of inappropriate developments and conflicting uses which have largely excluded the public from major portions of the Boundary Bay coastal zone, or which have eliminated opportunities for the appreciation of coastal resources.

Under the Municipal Act, Surrey, White Rock, Delta, and the Greater Vancouver Regional District may create land use designations in official community plans to regulate the type, density, siting, size, and dimensions of land, buildings, and structures to maintain views and access (B.C., 1979b: s.963(1)). This mandate includes regulatory powers to control development within specific zones to minimize obstructing public access or impairing visual esthetics of such public lands as coastal areas. However, there are no standards or provincial objectives provided in the legislation specifying on what basis public access and viewsheds should be maintained or improved as development approval conditions. As a result, local bylaws and zoning patterns adopted by individual municipalities and regional districts often allow the incremental loss of the public's use to' shore areas. Nowhere else is this more evident than in Boundary Bay. Large portions of

the Boundary Bay coastal zone are committed to urban and commercial activities with little or no opportunity for public access.

Examples of public alienation to the coastal zone include the Burlington Northern Railway (BNR) and Highway 99 which dominate the entire coastline from the north side of Mud Bay to the international border. Private land ownership is also a constraint on public use of the shore zone. Even where access points are possible, they are often unofficially incorporated into private lots, and only known to local residents (Surrey, 1978). Thus, recreational opportunities to support a growing regional population are restricted.

Surrey Views and Waterfront Policy. Recognizing that there are increasing development pressures for Boundary Bay scenic vistas, the Surrey Official Community Plan includes a policy to encourage developers to concentrate, or cluster, developments when constructing new subdivisions in coastal areas, with a provision that a portion of the land is retained for public open space and esthetics (Surrey, 1986: 164-165). The Views and Waterfront Policy also includes compensatory density bonus incentives to developers who incorporate such clustering patterns into the design of their projects.

A major weakness of this policy, however, is that it is discretionary. Municipalities should ensure mandatory public rights-of-way dedication for shoreline access, rather than relying on developers to voluntarily designate public open spaces as part of new subdivisions or housing developments.

A second weakness of the Surrey Views and Waterfront Policy is that it provides no guiding criteria to prescribe which portion of the land should remain undeveloped for public use. It could potentially be construed as an invitation to trade inappropriate land for construction, for high-density urban developments. However, the same land which may be unsatisfactory for engineering reasons may also be unsuitable for a park. To improve this policy, certain criteria need to be established and met to ensure that the land which is reserved for public access, open spaces, and esthetics adequately meets the public's needs.

A third weakness of the Surrey Views and Waterfront Policy is that it is concerned only with residential property densities. It does not attempt to regulate public access and esthetics loss resulting from commercial or industrial developments. This is because the majority of the Surrey Boundary Bay coastline is zoned for urban-residential and agricultural uses (Surrey, 1986: 344). However, because urban areas can be used for commercial, institutional, and transportation purposes, it is conceivable that a shift in development patterns toward these uses along portions of the Boundary Bay shore zone could virtually eliminate the public's use of, or access to, local beaches, wetlands, and wildlife habitat (Surrey, 1986: 342). Thus, there should be a provision in the Views and Waterfront Policy requiring all activities to maintain or increase public access and esthetic opportunities as development approval conditions.

Greater Vancouver Regional District (GVRD) In comparison to municipal and provincial governments, the GVRD has been instrumental in securing coastal areas for. public access and esthetics in its regional parks system. Specifically, the GVRD played a crucial role in raising sufficient public awareness and concern to lobby for expansion of the Boundary Bay Regional Park on the east side of Tsawwassen peninsula, by requiring the dedication of 90-hectares of adjacent habitat as a housing development approval condition (Greater Vancouver Regional District, 1986). This is a significant accomplishment given its relatively weak planning mandate, compared to areas under municipal and provincial jurisdiction

FREMP Recreation Plan Other recent initiatives to integrate public access planning efforts among government agencies have been formulated by the Fraser River Estuary Management Program Recreation Work Group. Currently, a draft plan proposes that: 1) senior governments be responsible to provide funding for land acquisitions, transfers, and management; 2) regional governments assume the role of recreation plan coordinators, supporting municipalities in their efforts to secure open space, and to continue acquiring parkland; and, 3) municipal governments direct planning efforts toward developing recreation sites along their shorelines, enhancing dikes, trails, and developingscenic routes (Canada and British Columbia, 1988).

However, significant institutional change empowering the GVRD to undertake such work would be required to achieve these goals. To date, the GVRD is not regularly involved with the daily affairs of municipalities or the province unless there is a specific project or issue relating to a regional park (Gamble, 1989). Further, there are presently no provincial or federal efforts to fund regional and municipal parkland acquisitions. Thus, while the FREMP Recreation Committee has improved the communication process among agencies, industries, and the publics, the absence of a legal mandate to coordinate their respective interests will seriously impair the implementation of the plan

Public Access and Esthetics: Cherry Point

In comparison to these programs and planning efforts in Boundary Bay, the Whatcom County Shoreline Management Program includes regulations to ensure state access and esthetics are considered in all land and water use decisions. Developers must provide access through individual or joint action with other proponents and landowners (Whatcom County, 1986: s.6.21.5.C(7)). All developments must be designed to avoid or minimize negative visual impacts to the scenic character of the area This policy is implemented through mandatory setbacks which, while minimizing development in geologically hazardous areas, also ensures that important viewsheds and access routes are protected. For example, port and industrial activities not requiring a water's edge or surface location must be located a minimum of 46-meters (150-feet) landward from either the ordinary high-water mark or the edge of coastal bluffs (Whatcom County, 1986: s.6.21.5.B(3)). In conjunction with state legislation, the Whatcom County development

standards and regulations use the physical forces of the coastal environment as a basis to maintain or improve public access and esthetic viewsheds. This is significantly different from the British Columbia model which depends on the ad hoc and discretionary preferences of individual developers.

There are also residential examples in other areas of Whatcom County where recent, innovative approaches to enhance public access and esthetics have been successfully accomplished as development approval conditions. Developers are now **required to** formally designate access to public beaches, as exemplified by a recently-constructed hotel and marina on Semiahmoo Spit. This is in response to earlier developments, such as at Birch Bay, Washington, where access to the beach area is restricted by a highly-congested urban waterfront fronting on a major state highway. As opposed to the British Columbia approach, there is concrete evidence that positive steps are being **taken** to enhance coastal zone quality through improved development standards and regulations, thus ensuring that alienation of public access and esthetics no longer occurs.

Natural Hazards: Boundary Bay

In British Columbia, coastal hazards management is generally a provincial and municipal responsibility. Yet, there are no province-wide or intermunicipal inventories or maps delineating where potential flood and erosion hazards exist. Consequently, the standards for regulating development in unstable and flood-prone areas are poorly developed. Municipalities will generally accept development proposals on unstable slopes if a geotechnical engineer certifies, in writing, that the building design will withstand all expected hazards (Gamble, 1989). However, geotechnical studies are seldom prepared for most coastal developments. They are only conducted if requested by a municipal building inspector. However, municipal building inspectors usually are not specifically trained to recognize potential hazards. While there is not an extensive record of coastal bluff failures in the Boundary Bay region to date, the probability of such events occurring is increasing given the rapid expansion onto unstable slopes and fill areas.

Similarly, the British Columbia approach to coastal flood hazards management has traditionally ignored the potential devastating ocean forces associated with high-tides and storm surges, which are often capable of causing more severe flooding, erosion, and mass wasting than freshwater systems. The provincial setbacks and flood construction elevations for developments adjacent to rivers tend to be quite rigorous, whereas those for structures along marine shorelines are loosely categorized with guidelines for swamps, ponds, sloughs, and ditches (B.C., 1987). As a result, the approval process used to identify and evaluate coastal flood hazard potential in areas proposed for development is inadequate and misleading.

A manifestation of such poorly formulated regulations is the presence of several houses located in coastal floodplains and spits in Boundary Bay. Based on provincial setbacks and elevations, the Surrey floodproofing bylaw specifies a 7.5-meter setback from the natural boundary of the sea, or from the inboard toe of dikes (Surrey, 1979: Part VIII). This is one half the distance required for developments from the high-water mark of the Serpentine and Nicomelcl rivers. Due to the cumulative effect of high-tides, storm surges, and prevailing winds over the relatively shallow water body, greater flood and erosion risks are likely to be experienced along the Boundary Bay shoreline (B.C., 1987). Clearly, neither the provincial setbacks, nor municipal bylaws adequately reflect this degree of hazard potential.

In response to these deficiencies, the provincial Water Management Branch has recently proposed improved coastal bluff setbacks designed to protect against marine-related flooding and erosion based on shoreline type: exposed, sheltered, or bedrock. If implemented, these regulations will reflect soil or rock stability, erosion potential, bluff height, and fetch (B.C., 1987). However, even if adopted as ministry policy, there is no provision for routine municipal-provincial review and amendment processes to update existing bylaws to ensure compliance with improved provincial standards. Rather, such amendments will continue to be adopted on an ad hoc basis only, as municipalities decide that bylaw revisions are necessary, or until after a crisis occurs involving substantial economic losses resulting from inadequate setbacks and elevations (Gamble, 1989). In a highly-urbanized coastal environment such as Boundary Bay, a hazards-management approach which lacks mandatory, periodic assessment and updating of municipal standards and regulations--which are ultimately based on provincial criteria--is reactive and does not necessarily protect the public from coastal flooding and-erosion.

Natural Hazards: Cherry Point

In comparison, coastal hazards control is an integral component of the Whatcom County Shoreline Management Program, based on state and federal law, and implemented at the local level. The Washington approach provides clear and consistent mechanisms for evaluating land use capabilities in the coastal zone, integrating sound engineering principles with limitations imposed by the physical environment. From this process, Whatcom County administers floodproofing and coastal bluff setbacks, using state atlases delineating where potential hazards are known to exist (Gamble, 1989). In contrast to practices in British Columbia, this system is used by land use planners and engineers for directing developers and property owners away from geologically hazardous and flood-prone areas. It provides consistent mechanisms for meeting the hazard management objectives of the state Shoreline Management Act.

A second distinction relates to the required level of preconstruction planning. Developers are responsible for preparing erosion-control plans detailing proposed excavation and fill procedures, disposal locations, and design alternatives for avoiding erosion impacts on steep shoreline bluffs, prior to any permits being issued for projects in the Cherry Point Industrial Management Unit (Whatcom County, 1986: s.6.21.5.A.(4)d). The plans are then reviewed and assessed for subsequent approval or rejection by the various regulatory agencies, which report directly to the county planning department and the state Department of Ecology.

In comparison, there are no standards, regulations, guidelines, or criteria to ensure the geological integrity of coastal bluffs when issuing building permits for Boundary Bay shoreline developments. Similarly, there are no municipal or provincial regulations requiring mandatory slope stabilization and erosion-control procedures as development approval conditions. As a result, residential and commercial developments which encroach onto unstable bluffs and in floodplains in Boundary Bay will be increasingly subject to risks associated with increased erosion and potential slope failure.

The Whatcom County coastal bluff setbacks increase with the size of proposed developments, reflecting the potential for greater risk of damage and losses associated with slope failure. For example, the state requires that single and multiple family residences be located 9 and 23 meters (30 and 75 feet), respectively, from coastal bluff crests, whereas port and industrial facilities require a 46-meter (W-foot) setback Even if the recently proposed British Columbia coastal setbacks are implemented as ministry policy, there is no provision to distinguish commercial and industrial facilities as requiring greater distances from bluffs than residential developments.

The test of these contrasting approaches to manage coastal hazards will be experienced in terms of the frequency and magnitude of personal, property, economic, and social losses associated with developments in each jurisdiction's coastal zone. The regulatory Whatcom County Shoreline Management Program promises to be more effective than the recently proposed strategies being considered in British Columbia.

Water Dependency: Boundary Bay

American federal and state coastal zone mandates require that development-siting priorities be given to water-dependent and related recreational, commercial, and industrial facilities. In comparison, there are no similar legislative requirements in the British Columbia institutional system Only in the Fraser, Squamish, and Cowichan river estuary management programs have the participating agencies voluntarily adopted such principles. Yet, these areas alone represent only a small percentage of the entire provincial coastline. Because neither water-dependency, nor an equivalent term, are normal coastal management principles of federal and provincial agencies, land and water allocations are

generally based on first-come, first-served priorities. This often results in unplanned and inappropriate coastal zone uses. Consequently, future development opportunities and ecological values are commonly preempted by activities which do not need to be on the coast.

Surrey Waterfront Industrial Zone. The municipality of Surrey administers a waterfront industrial zone which gives **priority** consideration to industrial and commercial activities requiring water for transportation, access of materials and goods, and as a basis for operations (Surrey, 1979: Part **XLV).** This designation is primarily used along the **heavily-industrialized** south shore of the Fraser River, at the northern extent of the municipality (Surrey, 1986). However, given the present mix of uses and activities along the Boundary Bay shoreline, it is clear that little or no consideration has been applied to assess the need for a water-oriented location. Major portions of the Boundary Bay coastal zone are occupied by, or are under application for, residential and light-commercial uses which restrict public access, impair **esthetics,** degrade ecologically sensitive areas, alter natural accretion landforms, or are subject to flood and erosion risks. Examples include: the Burlington Northern Railway, the highly-congested White Rock and South Surrey waterfronts, and proposed golf courses and casinos fronting Mud Bay. As a result, the quality and abundance of natural resources in the Boundary Bay coastal zone are diminishing rapidly.

Water Dependency: Cherry Point

In accordance with federal and state legislation, water dependency is a fundamental and explicit component of the Whatcom County Shoreline Management Program. **Shore-**dependent and related industrial facilities requiring access to the coastal zone are given preference over other developments (Whatcom County, 1986: **s.6.21.3.B).** These include the construction and operation of ports, piers, shore defense works, and buildings intrinsic to such activities. Other structures and activities may also be permitted as conditional uses under provisions of the Shoreline Management Act (Washington, 1986). However, these are only allowed if the applicant can demonstrate to the agencies and the public that impacts associated with their construction will be **minimized** or avoided (Whatcom County, 1986: **s.6.21.4.C(1)a).** The success of the water-dependency policy can be measured by the presence of several oil refineries and storage tanks located several hundred meters upland from the shoreline. This policy has helped to preserve the ecological sensitivity and physical characteristics of the Cherry Point coastal zone, while accommodating industry's needs.

Because water-dependency is enshrined in federal and state legislation, and reinforced by local regulations and planning mechanisms, conflicting coastal zone development pressures are **minimize**d. In contrast to the British Columbia approach, this **institutionalized** framework establishes priorities for maintaining a balance between needed economic development and long-term ecological sustainability. As a result;

nonwaterdependent developments are prevented through integrated planning, supported by federal and state legislation, and local regulations.

SUMMARY

These 2 case studies reveal several major differences between the Canadian and American approaches to coastal management. The British Columbia approach clearly does not accomplish the same coastal management objectives or ends as the American. The comparative evaluation of coastal planning mechanisms, programs, and regulatory procedures exemplified in Boundary Bay, British Columbia and Cherry Point, Washington is summarized below in terms of efficiency, effectiveness, and quity.

Efficiency

Clarity Not causes for delays in making appropriate decisions which benefit the British Columbia coastal zone in a timely fashion are numerous. These include: unclear, inconsistent, and incompatible policies and practices among government levels. In contrast to the Cherry Point Industrial Management Unit, there are no streamlined procedures to prescribe where developments can and cannot exist, nor what mitigative measures must be taken to minimize impacts to water quality, fish and wildlife habitats, public access, esthetics, natural hazards, or loss of future economic opportunities. Within Cherry Point, these objectives are being met using focused environmental impact studies as routine land and water use planning mechanisms. There are no similar processes in Boundary Bay to provide developers and the public with federal, provincial, regional, or municipal expectations. Nor are there legally-binding procedures for the various regulatory agencies to evaluate, and make decisions concerning, proposed coastal zone developments. Further, there are no mandatory designations or restrictions to prohibit residential, commercial, or industrial developments from locating in ecologically-sensitive habitats, or within flood and erosion-prone areas. This is because a consensus has not been reached on how to identify and manage such areas. Thus, there are no clearly established land, water, and resource allocation principles or criteria to balance conflicting demands in the coastal zone.

Consistency Goals and objectives among regulatory agencies are often inconsistent. Examples include'differing federal-provincial approaches to manage water quality and habitat, and provincial-municipal discrepancies to maintain or enhance public access and esthetics.

Decisions by one level of government to regulate certain land and water uses frequently contradict policies of other levels. For example, despite persevering efforts and recommendations by the Canadian Wildlife Service to designate Boundary Bay as a wetland of international significance, with the support of the Fraser Valley Wetlands Habitat Committee, Federation of B.C. Naturalists, British Columbia Wildlife Federation,

Ducks Unlimited, and The Nature Trust of B.C., the provincial government has refused to endorse an application for Ramsar status, or to relinquish development opportunities in the area. As a result, future generations will be forced to cope with a vast array of land and water uses which could well destroy the last remaining habitat in the entire Fraser delta, which currently supports internationally-significant numbers of shorebirds and waterfowl. Thus, conflicting priorities among government agencies have prevented the establishment of a systems approach to protect coastal resources.

Effectiveness

Integration. In the absence of integrated decision making and coordination, the unilateral efforts of each institution are only partially effective for comprehensively managing the coastal zone without complementary programs and support from other agencies.

In comparison, the Whatcom County Shoreline Management Program regulations and standards comprise several essential components for effective coastal zone management. These include: complementary federal, state, and local government mandates for identifying, protecting, and managing ecologically-significant wetlands and shore accretion features; mandatory procedures for increasing public access and esthetics to shorelands as integral components of accommodating industrial development; and, clear standards for siting port operations, cargohandling facilities, and oil refineries while minimizing environmental impacts. A concerted effort has been made to present consistent development policies while minimizing regulatory confusion, to eliminate conflicting or duplicative shoreline regulations. This has been implemented using environmental impact assessments to focus the various goals, objectives, mandates, and interests of agencies, publics, and industries.

Funding. Consensus among agency personnel and private interest groups is that current funding levels to support British Columbia coastal zone management efforts are inadequate. There have been few attempts and insufficient financial commitment to reform poor coastal land, water, and resource management practices. Provincial and federal politicians appear to lack the initiative to commit even a small proportion of government revenues for managing the coastal zone.

Equity

Public Participation. A major deficiency of the British Columbia coastal zone management institutional arrangements is the inadequacy of mandatory public participation programs and opportunities. Only the Fraser River Estuary Management Program (FREMP) and the Greater Vancouver Regional District (GVRD) have attempted to alleviate this weakness. They provide opportunities to inform the public of proposed land and water activities, and foster avenues to strengthen decision making.

However, these mechanisms alone are insufficient to ensure that administrative fairness is adequately incorporated in all coastal resource use decisions. Because the interests of FREMP are primarily water-oriented, and the planning powers of the GVRD are minimal within municipal boundaries, information gathering and dissemination processes for most proposed upland activities in these jurisdictions are lacking. These constraints are further aggravated by limited funding support by senior governments.

There are no statutory requirements for federal and provincial agencies to develop public information programs such as hearings, seminars, workshops, or to issue newsletters and publications. In the absence of a legal mandate, the effectiveness of existing processes to facilitate public participation for most coastal planning and decision making depends entirely on political goodwill and informal agency initiatives. In general, opportunities for public participation in decision making processes have been weak and ad hoc at both federal and provincial levels. Indeed, it is only the municipal and regional governments which have a legal obligation to involve the public in land use decision making.

Within the Boundary Bay study area, there has been no clear record of public involvement programs to assist coastal land, water, and resource use planning decisions. Certain private organizations have, through their own efforts, provided a vital role to apply pressure and educate political leaders of the urgency to address some of the more critical concerns in Boundary Bay. The most noteworthy of these are the accomplishments of the Fraser Valley Wetlands Habitat Committee. This group recently succeeded in conveying to the provincial environment minister a need to protect the crucial ecological values associated with Boundary Bay. However, efforts to proceed with a wildlife management area designation have been suspended, pending the evaluation and recommendations of a proposed interagency environmental study of this area. Because private interest groups have been excluded from the management committees of this study, and since Canadian federal and provincial agencies do not regularly canvass public opinions, concerns, or suggestions, improvements to coastal land and water allocation processes will continue to be slow in responding to public concerns.

Private Stewardship There are no mechanisms or efforts to develop land use management programs with property owners to benefit fish and wildlife habitat, particularly in the surrounding agricultural community., Similarly, volunteer citizen monitoring and enhancement projects are not encouraged, despite successes from such approaches adopted in the Puget Sound Water Quality Plan. If implemented, these procedures may help overcome some deficiencies in the current system associated with inadequate staffing and financial resources to ensure a commitment to water quality and ecological protection management. By having landowners collectively agree with the agencies to undertake conservation-oriented programs on their properties, large wildlife and waterfowl habitat areas could be retained and managed at significantly lower costs than through acquisitions alone. However, the public is not actively involved in proposed

land use decisions, nor are there incentives for cooperative land use stewardship in the British Columbia coastal zone.

This international comparison helps illustrate the inadequacies of the British Columbia approach to coastal zone management. It can be characterized as many individual agencies, each operating with specific mandates. In the absence of comprehensive federal or provincial objectives for managing coastal resources, the British Columbia approach has produced a'comparatively unstructured and reactive system to the governance of the coastal zone.

RECOMMENDATIONS

Coastal Zone Management Acts. In the absence of an integrated planning system, new federal and provincial legislation is required which empowers lead agencies to coordinate and control the various programs, policies, and mandates of all institutions and organizations responsible for managing water quality, wetlands, fish and wildlife resources, public access, esthetics, and natural hazards. Lead agency status could be assigned either to existing governmental bodies or to new ones. Such legislation should be complemented by local regulatory authority for assessing coastal development proposals and monitoring activities.

This option is deemed more efficient than simply patching up the current regulatory system through amendments to existing legislation. Under the proposed system, each agency would become accountable to the federal and provincial lead agencies where its actions affect other coastal interests. However, present agency roles and responsibilities to manage various coastal resources should continue. The major difference would be that individual agency mandates could focus on common goals and objectives, promoting a balance between long-term ecological sustainability and needed economic development.

Regional Coastal Management Programs. Owing to the size and complexity of the British Columbia coastal zone, detailed regional management programs should be prepared and implemented by interagency task forces, similar to those currently operating in the Cowichan, Squamish, and Fraser river estuaries. Local citizens, including native bands, interest groups, research organizations, and industries should be encouraged to participate in the work of each task force, and to assist in planning and implementing each regional coastal management program. Individuals familiar with the resources, constraints, demands, and conflicts of each region would be engaged in .a proactive planning system. They would adopt and implement detailed land and water use regulations, standards, designations, and setbacks based on broader federal and provincial policies.

Environmental Impact Assessments All proposed coastal developments should be subjected to coordinated interagency reviews to ensure that individual agency -goals, objectives, and policies are consistently met and adhered to, as an integrated system. This

should be facilitated using environmental impact assessments, funded by project proponents, as a basis for regional planning and decision making. Such studies should be appropriately scoped to reduce unnecessary data collection and costs, and to provide clear, consistent, and concise policy direction. Although the immediate costs of adopting such a rigorous planning strategy would be higher to developers and government than at present, such a process is essential to minimize irreparable loss or damage to the natural resources of the coastal zone as development occurs.

There is much to be gamed by adopting locally-administered review processes similar in structure to the federal Environmental Assessment and Review Process (EARP). Currently, EARP requires that environmental and socioeconomic effects of major projects under federal control be considered and asses4 during planning phases. Where potentially significant impacts are identified, the federal Minister of Environment is asked to establish an independent environmental assessment panel to conduct a public review (Marshall et al., 1987). Although less well-structured, environmental impact assessments can be required under the provincial Environment Management Act at the discretion of the B.C. Minister of Environment for projects or activities under provincial jurisdiction. However, other than for major projects, neither review process has been used on a routine basis to assist in most resource-based decisions affecting the coastal zone.

Recommendations resulting from environmental assessment reviews of oil and gas exploration and production proposals in Canada's coastal zones have made significant contributions to the management of these areas (Marshall et al., 1987; Higham and Day, 1989). Three important contributions of conducting environmental impact assessments include: (1) scientific research; (2) regional planning and resource management; and, (3) coastal community development. These same attributes could be realized if locally-administered environmental reviews formed an integral part of regional resource use decision making, rather than being reserved only for major projects.

Funding. A fundamental weakness in the British Columbia institutional system to manage coastal resources is the inadequate financial and staff support to implement existing programs. A reallocation of existing funds is required to: comprehensively monitor marine water quality; acquire and develop ecologically-sensitive areas for fish and wildlife habitat; support regional and municipal efforts in the acquisition and development of coastal-recreation parks; and, define and map geologically unstable areas to develop a comprehensive coastal hazards management policy.

Recognizing the high costs of land acquisition and management to meet these objectives in an era of fiscal constraint, increased emphasis must be placed on private stewardship of coastal resources. In this approach, property owners would formally agree with a sponsoring agency, such as Wildlife Habitat Canada, to manage a parcel of their land for conservation or recreation purposes, in return for either monetary or nonmonetary incentives. Through such a program, coastal habitats and open spaces could be retained

and managed at significantly lower costs than through direct expropriation and acquisition. A key ingredient to overcome funding deficiencies is to integrate existing activities of private landowners in the planning and implementation stages of larger coastal management objectives. In light of budgetary limitations, such efforts may become the only cost-effective method for dealing with expensive land and water acquisitions and management programs.

Public Involvement. A meaningful public involvement strategy is needed through volunteer citizen planning, monitoring, and enhancement programs. The public would be more likely to endorse final land and water use decisions if their efforts, expertise, and suggestions were incorporated in the planning process. By directly involving local citizens in nontechnical tasks which benefit the coastal environment, management agencies would be able to redirect their limited technical staff and financial resources to more complex planning and management issues.

Federal and Provincial Dispute Resolution Successful implementation of federal and provincial coastal management legislation, and regionally-based development standards and regulations, will ultimately depend on resolving inter-jurisdictional rivalries. This must be achieved through a coordinated system of communication, cooperation, negotiation, and compromise under the legally-binding requirements of the proposed federal and provincial coastal zone management acts. If an agency fails to establish complementary management programs which contribute to the common goals and objectives of these statutes, there must be concerted efforts from other institutions and the public to apply political pressure and media attention to require conformity with local, regional, provincial, and federal coastal management policies. Such efforts would help mitigate problems which currently arise in coastal areas due to piecemeal planning actions by individual agencies, each pursuing their own goals and objectives.

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