

**RIC Report 011
Discussion Document**

Coastal Resource Inventory Review

Prepared for:

The Resources Inventory Committee

Prepared by:

**Don Howes
Environmental Emergency Services Branch
B.C. Environment**

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Preamble

This report is submitted to the Resources Inventory Committee (RIC) by the Environmental Emergency Services Branch, BC Environment.

The Resources Inventory Committee consists of representatives from various ministries and agencies of the Canadian and the British Columbia governments. First Nations peoples are represented in the Committee. RIC objectives are to develop a common set of standards and procedures for the provincial resources inventories, as recommended by the Forest Resources Commission in its report *The Future of Our Forests*.

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Contents of this report are presented for discussion purposes only. A formal technical review of this document has not yet been undertaken. Funding from the partnership agreement does not imply acceptance or approval of any statements or information contained herein by either government. This document is not official policy of Forestry Canada nor of any British Columbia Government Ministry or Agency.

For additional copies and/or further information about the Resources Inventory Committee please contact:

The Executive Secretariat
Resources Inventory Committee
840 Cormorant Street
Victoria, BC V8W 1R1

FAX: (604) 384-1841

Executive Summary

Introduction

The Province has a major role in coastal resource inventory because of its responsibility to protect and manage. Crown Lands. Provincial jurisdiction includes the intertidal zone and seabed of inland marine water bodies (e.g Strait of Georgia) unless responsibility has been transferred specifically to a federal jurisdiction or is in private ownership. Residing in or on these foreshore and seabed areas are Provincial resources that include archaeological, recreational, heritage, wildlife and aquatic resources. Responsibility to protect and manage other marine resources, such as waterfowl and fisheries, is often shared with federal agencies.

This report provides an assessment of the status of the coastal inventory programs in British Columbia. The report details the results of a strategic user-collector survey and outlines the coastal inventory issues that need to be addressed, particularly with the shift of coastal user-collectors to GIS computer systems.

User-Collector Survey

A high-level coastal user-collector survey was undertaken in May 1992 to provide strategic information related to coastal inventory products and the use of these products. Key trends from this survey include:

- There are multiple inventory user-collectors (e.g. Provincial, Federal, and Crown Corporation agencies) and hence the need to develop well-defined coordination and liaison between different groups.
- There is a high demand for physical, biological and human use coastal resource information.
- BC Environment, Lands and Parks is the major Provincial collector and user of coastal data.
- User product requirements are shifting from hard copy maps/reports to include electronic information in data bases and GIS formats.
- The greatest use of the coastal resource data is for multiple levels of planning (e.g. strategic and site planning). The most important types of information used in the planning process are physical, biological and human use data.

Issues

There are a number of issues facing coastal resource inventory user and collectors in the 1990's. These issues have been identified in other studies over the past 15 years, however, the shift to GIS computer systems makes their resolution necessity.

Lack of Provincial-Wide Information

There is a lack of quality coastal inventory information in BC, yet, there is a high demand for contemporary baseline coast resource inventory information. These resource inventory deficiencies are hampering present-day coastal resource management and land use planning.

Access to Existing Coastal Inventory Information

Existing resource information has commonly been generated and stored in a variety of locations and in a manner that is not easily accessed for other users.

Data Collection and Classification Standards

There are no Provincial data collection and inventory classification systems standards. Standards need to be developed to promote cooperative data collection and sharing, particularly with the shift to GIS systems and use of contractor data collectors.

Data Reliability and Quality

Recent experiences in data compilation indicate that the quality/reliability of some existing data is questionable. It is mandatory that all data (existing-new) be assessed prior to use and/or entry in GIS computer systems. There are no quality assessment data guidelines for determining the quality/reliability of existing or new inventory data.

Base Maps

The spatial component of most coastal inventories is commonly depicted on different types of base maps. This creates problems with the transfer to the GIS computer systems and the sharing of data between agencies. The components for a standard Provincial base map for coastal inventory needs to be defined and the maps developed for use by the data collectors.

Organization

There is no Provincial agency or organizational structure within the Provincial government to coordinate and conduct coastal inventories, although, there are a number of Provincial agencies that collect and/or use coastal information. Without an agency and organizational structure, there has been no focus for internal and external user/collectors, and Provincial inventory development has been on an ad hoc basis. Consequently, this results in duplication of efforts and the inefficient use of inventory dollars.

Training

There is an increasing shortage of qualified younger resource scientists with coastal inventory expertise. Their training is often a random process. The lack of junior staff in inventory agencies has also reduced the transfer of knowledge from senior scientist with years of practical experience to junior staff. There is a need for a comprehensive training program.

Native Participation

Both the Federal and Provincial Governments are negotiating or have negotiated co-management agreements with the Native Communities. Details of these agreements have not been fully determined, however it is expected that joint data collection and management will occur between the parties. A process needs to be created to ensure that native communities are involved in all aspects of the inventory process.

Jurisdiction

One problem that has plagued coastal inventories has been the failure to define the responsibility – of different Provincial and Federal agencies with respect to coastal inventory. There is the need to clarify the inventory responsibility between these two levels of

government and to develop a process that will promote data sharing, coordinated research and inventory, and the development of common standards and classifications. Resolution of this issue has been hindered, provincially because there is no Provincial agency and organizational structure within the Provincial government undertaking this coordination.

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1.0 Introduction

The Province has a major role, in coastal. resource inventory because of its responsibility to protect and manage Crown Lands.

Provincial jurisdiction along the coast of British Columbia includes all land between the high and low water mark, the seabed of the Strait of Georgia, Juan de Fuca and Queen Charlotte Sound-Johnstone Strait, and the coastal seabed between major headlands unless responsibility has been transferred specifically to a federal jurisdiction or is in private ownership. Residing in or on these foreshore and seabed areas are Provincial resources that include archaeological, recreational, heritage, wildlife and aquatic resources. Responsibility to protect and manage marine resources, such as waterfowl and fisheries, is often shared with federal agencies.

The purpose of this report is to provide an assessment of the status of the coastal inventory programs. in British Columbia. The report details:

- Broad user-collector groups, their product requirements and use of coastal data.
- A summary of the major coastal inventory issues that need to be addressed, particularly with the shift of resource inventories to GIS computer systems.

2.0 Coastal Data Collector-Users and Their Needs

2.1 Agency Review

Ministry of Energy, Mines and Petroleum Resources

Coastal and Offshore Data and Information is used for assessing the potential impacts of offshore hydrocarbon development and strategic planning for onshore energy facilities and infrastructure. Coastal Inventory and mapping programs include geology, minerals, terrain and landforms, aggregate sources, slope stability and hazards for a wide range of uses.

Ministry of Transportation and Highways

Coastal Data and Information is used for marine transportation planning for ferry routes, dock, highway construction and maintenance, community port authority planning and other related purposes.

Ministry of Forests

Coastal Data and Information is used primarily for planning for coastal log handling, transportation, log dump and storage sites; and for assisting in the resolution of conflicts with other coastal resources and resource users.

Ministry of Municipal Affairs

Coastal Data and Information is used extensively by Regional Districts, Municipalities, and the Islands Trust.

Ministry of Agriculture, Fisheries and Food

Coastal Data and Information is used for primarily for fish, shellfish and marine vegetation mariculture referrals and site planning

Ministry of Tourism

Coastal Data and Information has been collected through a Coastal Tourism Resource Inventory Project at a scale of 1:250,000 to determine existing tourism use, capability and industry potential/feasibility, and for integrated coastal land use management/conflict resolution and tourism policy/planning purposes.

BC Lands

Coastal Data and Information has been collected and used for Coastal Resource Information Studies and also for briefs, referrals and all types of planning including crown land status, foreshore leasing/disposition, management, policy development and decision making.

BC Parks

Coastal Data and Information is used for marine/coastal park and ecological reserve planning, acquisition, public information and management.

BC Environment

Coastal Data and Information is collected and used for a wide variety of environmental planning, policy development, briefs, referrals, monitoring, assessments, permits, spill response, habitat management, regulation drafting, water quality and waste management and major project reviews.

Nature Trust of BC

Coastal Data and Information is used primarily for all types of planning, site monitoring and evaluation.

Royal British Columbia Museum

Coastal Data and Information is collected and used for research and for preparing handbooks, exhibits, lectures and other public programmes.

Archaeology Branch

Coastal Data and Information is collected and used for all types of planning, referrals, research and monitoring of archaeological sites.

Other Provincial Agencies

Coastal Data and Information is also used extensively by Crown Corporations such as BC Ferries and BC Hydro; and by other Ministries including: Aboriginal Affairs; Advanced Education, Training and Technology (SPARK initiative, Science Council); and Economic Development, Small Business and Trade.

Federal Agencies

Coastal Data and Information is collected extensively and used primarily by Environment Canada, the Department of Fisheries and Oceans, the Department of National Defence and the Geological Survey of Canada for a wide variety of purposes, some of which overlap to varying degrees with provincial purposes.

Consultants, Academic Institutions and the Private Sector

Coastal Data and Information is collected by some consultants for government agencies and for industry and used for a wide variety of purposes including research, education, commercial and industrial development.

2.2 1992 User-Collector Survey

A high-level coastal user-collector survey was undertaken in May 1992 to provide strategic information related to coastal inventory products and applications of these products.

This survey is not intended to be equivalent to the intensive surveys conducted by the other Task Forces due to time constraints, lack of staff and operational funds, and late involvement with RIC. A one page questionnaire was faxed to an number of Provincial and Federal Government agencies, consultants and Crown Corporations. As the purpose of the survey was to obtain strategic information, not all agencies or consultants were sent the questionnaire. Respondents were faxed the questionnaire and asked to respond within two weeks. The number of responses in this short time period indicates a strong interest in the subject matter. A copy of the questionnaire, the responding agencies and other data requirements and uses recorded by the respondents are included in Appendix III.

The results from the preliminary analyses of the data are summarized below and presented in Figures 1 to 4. No detailed analyses have not been undertaken of the data.

Data Users-Collectors (Figures 1 and 2)

- All the agencies (Provincial, Federal, Crown Corporation and Consultants) appear to be equally involved in data collection and the use of coastal data. This indicates the need to develop strong coordination and liaisons between the inventory user-collectors at all levels of government.
- Users exceed collectors by 2 to 3 times which suggests there is large demand for coastal information.
- From a Provincial perspective, BCELP is the major collector and user of coastal and derived data.
- Consultants appear to be major collectors of coastal inventory information which has implications on standards for data collection and inventory mapping (Refer to Section 3.3)
- Physical, biological and human use data are the most frequently used types of data; their demand is approximately equal.

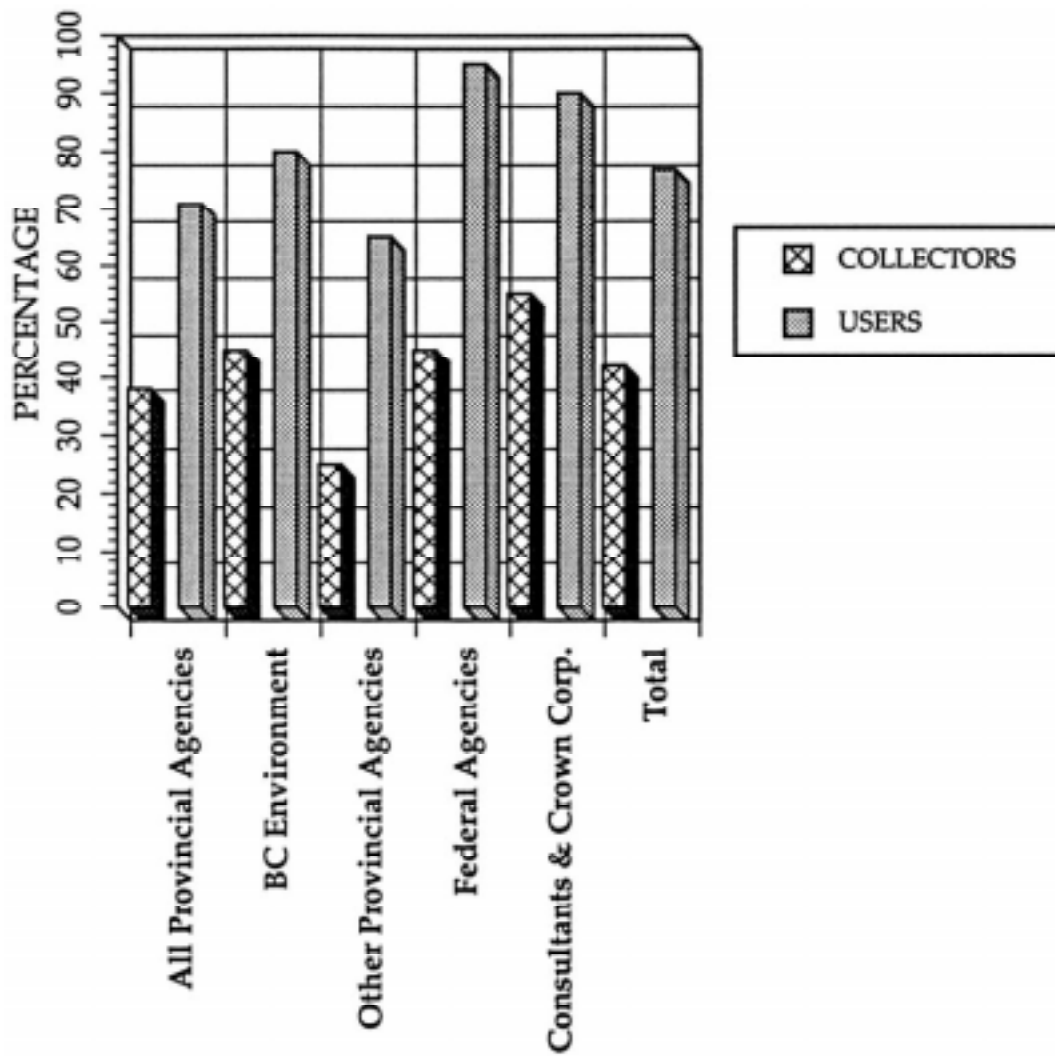


Figure 1. Percentage of survey respondents who identified themselves as collectors or users of coastal data and information.

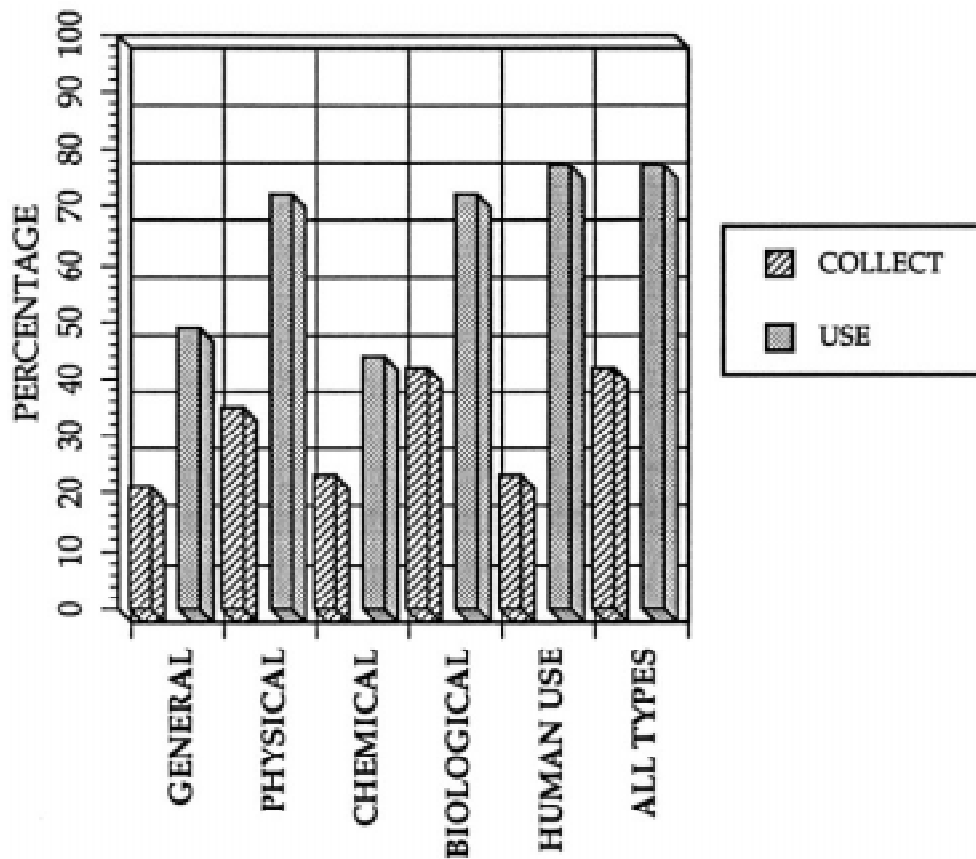


Figure 2. Percentage of survey respondents who collect or use different types of coastal data and information.

Products (Figure 3)

- Review of the product requirements indicates that the product types required by coastal users has or is in the process of shifting from hard copy maps and reports to also include electronic information in data bases and GIS formats.
- With increasing demand for electronic products, coastal data collectors will have to migrate to GIS systems ;and electronic data bases. This shift has implications on data collection and mapping standards, base maps, data quality and data distribution (refer to Section 3.0 – Issues).

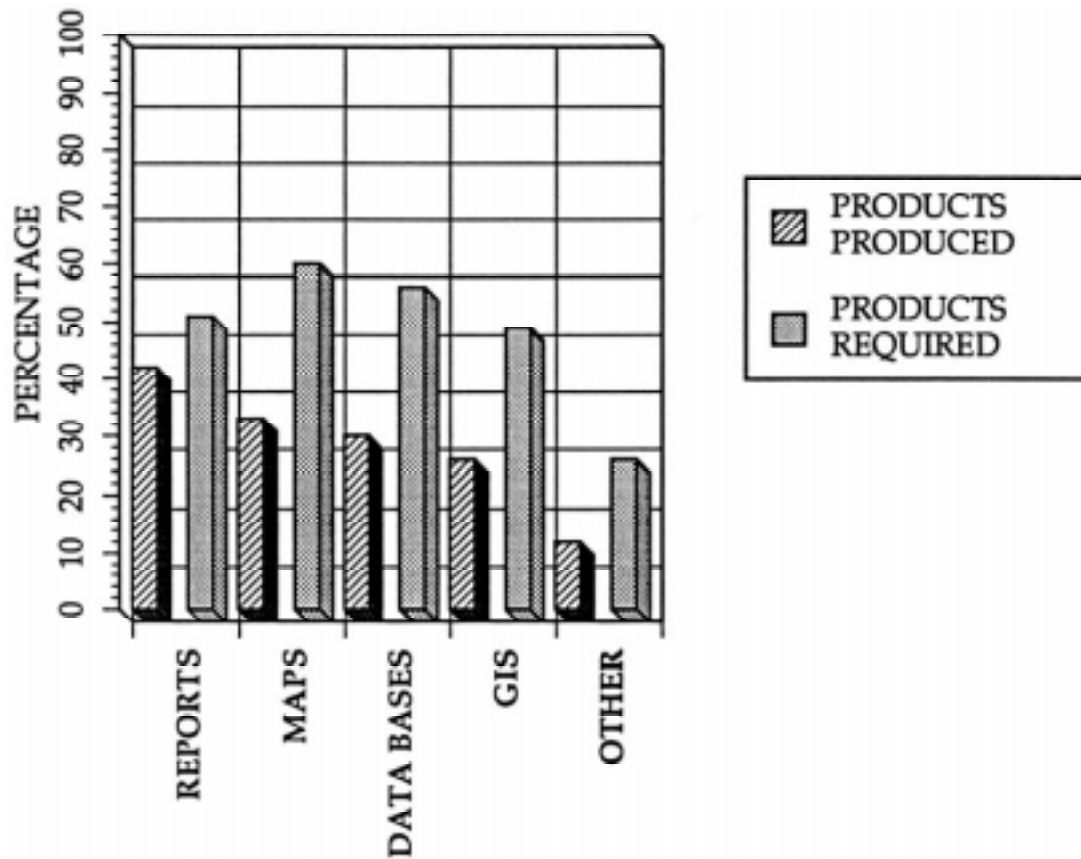


Figure 3. Percentage of respondents who produce or require coastal data/information products.

Use of Coastal Data (Figure 4)

- Coastal resource information is used for a wide range of applications: strategic, regional and site planning, referrals, briefs, environmental assessment and research. Other uses are detailed in Appendix III.
- The greatest use of the coastal resource data is for various levels of planning. Planning information requirements are dominated by the need for physical, biological and human use data sets.

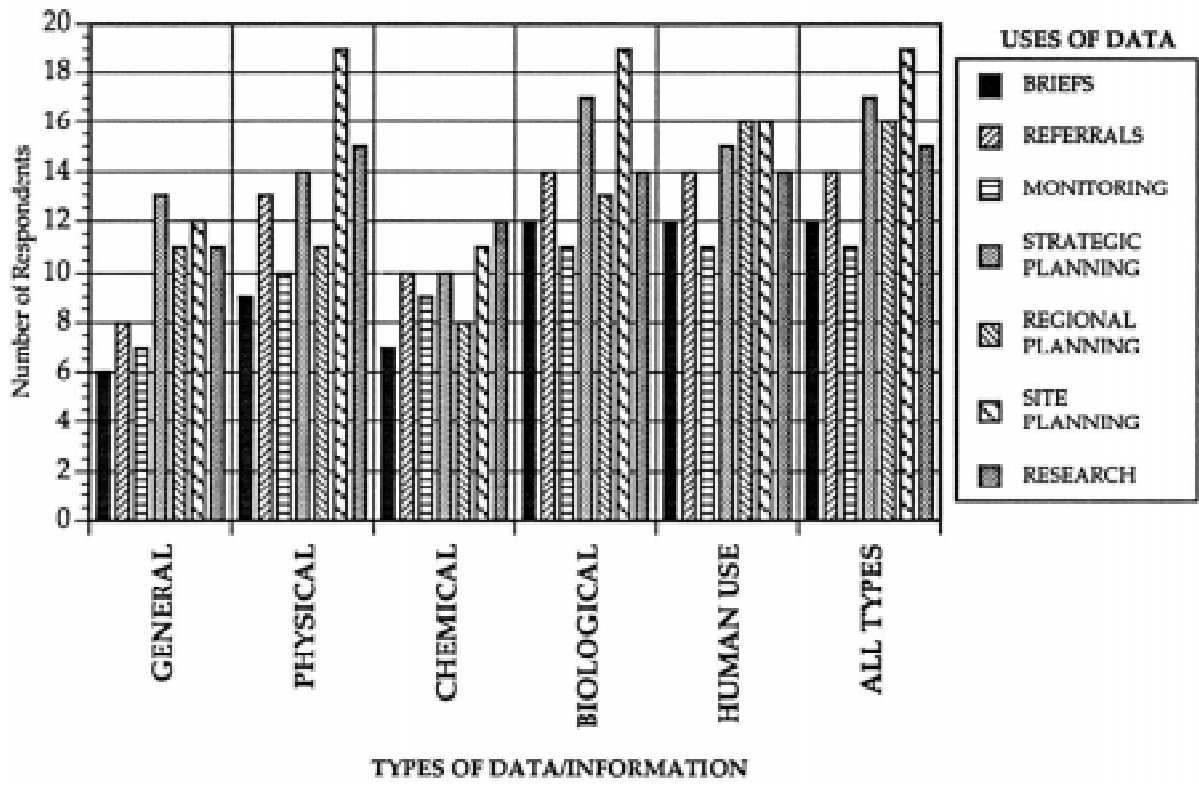


Figure 4. Number of respondents who use coastal data and information for different purposes.

3.0 Coastal Zone Resource Inventory Issues

This section details a number of issues facing coastal resource inventory users and collectors in the 1990's. These issues have been identified in several other studies over the past 15 years, however, the shift to GIS computer systems makes the resolution of these issues a necessity.

A number of sources have been used in the identification of issues. They include interview and discussions with coastal resource personnel involved in the development of the Environmental Emergency Services Branch Oil Spill Response Information System – OSRIS Program for the past two years, the results from the User-Collector survey, previous surveys summarized in Appendix I and II, and the collective experience in resource inventory of the authors.

3.1 Lack of Provincial-Wide Information

A number of surveys have been conducted in the past 15 years concerning the status of existing resource inventory information available for the coast of British Columbia (Appendix I and II and a 1990 MOE Feasibility Study for an electronic Oil Spill Response Information System – OSRIS). These studies not only confirm that present-day coastal resource management and land use planning is hampered by deficiencies in information, but also indicate that there has been little change in this situation since the late 1970's. There is a high user need for contemporary baseline coastal resource inventory program to provide information, particularly physical and biological data for planning and referrals purposes (refer to Section 2.2).

As a general guideline, there is a lack of quality existing physical, biological, and human use inventory information outside of the Georgia Strait and isolated areas on the west coast of Vancouver Island and the Queen Charlotte Islands. The 1977 survey of producers and users recommended the implementation of a biophysical inventory program (refer to Appendix I). This program has never developed, although some ad hoc efforts have and continue to be attempted by individual agencies. Many of the coastal inventory programs in the Ministry of Environment ceased in the early 1980's (e.g. Physical Shoreline Mapping, Estuary Mapping and annual bird surveys). Some of these inventories have been re-initiated with the EESB's OSRIS program.

3.2 Access To Existing Coastal Inventory Information

Existing resource information has commonly been generated and stored in a manner that is not easily retrieved or accessed for other coastal users. This problem was recognized in 1977 (refer to Appendix 1). Recent experience from the EESB's OSRIS Program indicates that this problem still exists. In fact, it has become more difficult since the transfer of data was to a computer GIS and database system.

Many of the existing products are not in an appropriate form for current needs and require transfer into digital formats to meet future user needs (refer to Section 2.2). Spatial information is typically portrayed on multiple types of hard copy maps (e.g. NTS, Hydrographic Charts) at different scales. Often there is only one copy of the map in a non-reproducible form, some lack scales, and very few are in a digital format. Attribute data may

be attached to the maps, stored in a paper file, lost, out of data and occasionally in a database, although these formats vary between agencies.

There is no central storage or distribution point of the coastal information, although Maps B.C. have copies of some inventory maps produced prior to the early 1980's. Nor is there a Coastal Information Directory that summarizes the type of data each agency collects; this was a recommendation of a Ministry of Environment and Park's 1987 survey (Appendix II).

3.3 Data Collection and Classification Standards

There are no Provincial standards with respect to data collection and inventory classification systems. Data collection and mapping classifications have been ad hoc; each agency collects its own data and maps according to its own standards. Internal agency standards often have not been documented. This has resulted in needless duplication of inventory efforts and the inefficient use of limited inventory dollars.

Identification of common data sets between agencies and development of Provincial data/mapping standards are required to promote cooperative multi-agency data collection and sharing. Standards also need to be developed to facilitate the shift to GIS systems and for use by of contractors who are often becoming the principle data collectors.

There is no coastal equivalent to "Describing Ecosystems in the Field" to promote and ensure that Provincial agencies collect and classify coastal data in the field to a Provincial standard. Some mapping classifications have been developed but have never been accepted as standard. Nor has any attempted been undertaken to have them accepted as defining the Provincial standard. For example, the Ministry of Environment developed the Physical Shoreline Classification System and Estuary Classification for British Columbia in the early 1980's and although other agencies use these systems, they have not been formally recognized. Others mapping classifications require development, while others, such as an Intertidal Habitat Classification for British Columbia, require further enhancement. Not only is there a need for mapping classification systems, there is also the need for the identification of appropriate criteria for interpretations, such as capability and suitability analysis, impact assessment and sensitivity mapping, and potential harvesting sites.

A comprehensive attempt to develop standard data collection and mapping classifications for physical, human use and biological resources in the MELP has been recently undertaken by the EESB's OSRIS Program. Although this work has been designed for other users and could help to form some Provincial standards in the future, there is no process currently in place to facilitate the establishment of Provincial data and mapping classifications standards.

3.4 Data Reliability/Quality

Most of the existing coastal inventory maps and data, and active inventories did not or do not address the reliability of the information. In general, inventory products do not provide an indication of sampling intensity, source and quality of information, experience and name of mapper, and other variables necessary for assessing the reliability and quality of data.

Recent compilation of coastal data for EESB's OSRIS Program indicates that some of the existing data required modification through extensive editing processes; other data had to be resurveyed. This experience indicates that the quality and reliability of existing data is

questionable and that it is mandatory that the data be assessed prior to use and/or entry into GIS computer systems.

Presently, there are no quality assessment guidelines for determining the quality and reliability of coastal data (existing or new). The development and application of this methodology is required to ensure that quality data is transferred into the emerging GIS systems. This process will also help to identify areas of the British Columbia coast that require repeat inventories. A proposed data assessment methodology has been developed and presented in a 1990 draft report to Environment Canada for a Sensitivity Information System. This proposed methodology could form the basis of a Provincial data assessment methodology and has been applied in EESBs OSRIS Program.

3.5 Base Maps

The spatial component of the coastal inventories are presently depicted on hard copies of different types of base maps (NTS Maps or Hydrographic Charts) at differing scales. This creates problems with the transfer of spatial data into GIS computer systems and the sharing of data between agencies.

A standard base map or series of base maps with established formats for geo-referencing is required. This problem was recognized during a GIS overview study conducted for DFO. After consultation with Recreational Fisheries and EESB of MELP, it was recommended that a composite base be created for inventory and data collection. The recommended base map should include the hydrographic charts, MELP Blueline Atlas and topography (NTS 1:250,000). TRIM would replace NTS 1:250,000 as data becomes available. The shoreline on the composite map would be derived from the hydrographic charts.

Some progress has been made in the development of this composite base map. EESB's OSRIS Program has created an example of this composite base map for the southern Strait of Georgia with the intend to share it with other agencies. It is expected that this will ease and promote resource data transferring and sharing between agencies. There is, however, the need to develop a Provincial standard base map that satisfies all Provincial agencies. This requires the identification of what shoreline and attributes (e.g. intertidal zone, low water line) associated with the shoreline should be included on the map.

3.6 Organization

There is no Provincial agency or organizational structure within the Provincial government to coordinate and conduct coastal inventories, although, there are a number of Provincial agencies that collect and/or use coastal information. Without this agency and organizational structure there has been no focus for internal and external user/collectors and Provincial inventory development has been on an ad hoc basis. The end result being the inefficient use of inventory dollars.

A Provincial agency and organizational structure is required to coordinate Provincial coastal inventory methodologies and current inventories in order to avoid duplication of effort, develop stronger liaisons between information-gathering and information-using agencies, liaison with the Federal Government, and develop an open integrated, computerized data-management system that serves user and collectors.

The EESB has addressed and undertaken several of the above functions in order to develop its OSRIS Program and to fulfil its obligations and responsibilities with Federal agencies in the event of a marine oil spill. An important feature of the OSRIS system design is its capabilities to perform integrated coastal management and land use applications.

3.7 Training

One of the more serious effects of decreased coastal inventory in government during the 1980's was the loss of trained and qualified personnel (and positions) to conduct inventory programs. Personnel have not been replaced and much of the present-day inventory is undertaken by contractors who have several years experience.

Training for recent graduates in the past was commonly provided by government. Following this training, young scientists tended to continue a career in the public service or entered the private sector. As government agencies do not hire recent graduates and tend to use experienced contractors, there is becoming a shortage of qualified younger resource scientists. Their training is often a random process. The lack of junior staff in inventory agencies has also reduced the transfer of knowledge from senior scientist with years of practical experience to junior staff. There is a need for a comprehensive training program.

3.8 Native Participation

Both the Federal and Provincial Governments are negotiating or have negotiated co-management agreements with the Native Community. Although the details of these agreements have not been fully determined, it is expected that joint data collection and management will occur between the parties. In addition, the native community are developing their own GIS systems and programs. Thus, a process needs to be developed to ensure that the native community participates in all aspects of the inventory process from data collection through to applications of the data.

3.9 Jurisdiction

As noted in the Introduction, the Provincial and Federal governments both have responsibilities with respect to coastal resources. A problem that has plagued coastal inventories has been that the responsibility of each agency is often not well-defined. This has resulted in the duplication of inventory effort, extra expenditures, and information not being collected. There is the need to clarify the inventory responsibility between these two levels of government and to develop a process that will promote data sharing, coordinated research and inventory, and the development of common standards and classifications. Resolution of this issue from a provincial perspective has been hindered, because there is no Provincial agency and organizational structure within the Provincial government undertaking this role.

Appendix 1: 1977 Survey of Coastal Data Producers/Users

Purpose

This survey was part of a study entitled, "*The Management of Coastal Resources in British Columbia*" carried out by the Federal/Provincial Coastal Zone Resource Subcommittee for the BC Land Resources Steering Committee.

Topics addressed include: current status with respect to baseline information; present and proposed inventory, planning and management initiatives; degree of coordination; information deficiencies and identification of biological, land-use, socio-economic and other data that should be collected; priority areas; user groups of information; mechanisms required for conducting baseline studies and interpreting data for coastal management purposes.

The purpose of the survey included: assessment of "state of the art" of coastal resource data storage and accessibility; extent and nature of interagency cooperation and liaison; and future requirements for coastal research and management.

Survey Participants

Federal/Provincial agencies with responsibility for managing resources in "coastal" areas, or whose activities impact coastal resources; individuals/institutions/private sector engaged in coastal research or related activities.

Results

The survey found that coastal resource management was hampered by inadequate information availability with major deficiencies in the quantity, quality, and orientation of coastal data/information. Issues identified include:

- An overall lack of complementary and comparative baseline data and inventory information regarding biological, chemical, physical, social, economic, legal and political aspects of coast.
- Scarcity of information regarding both natural and man-made factors which affect the stability, diversity, and productivity of coastal ecosystems (i.e. lack of knowledge on temporal/spatial distribution of nutrients and hazardous chemicals and their effect on coastal ecosystems, and assimilative capacity of coastal zone for wastes of all kinds).
- The absence of appropriate/applicable suitability classifications or criteria to facilitate planning, resource allocation and protection.
- A tendency for data/information to be generated and stored in such a manner that they are not easily retrievable, and therefore of limited value to other coastal data collectors/users.

Recommendations

Recommendations of the final report, "*The Management of Coastal Resources in British Columbia*" included:

- 1) Preparation of a coastal resource folio or atlas to include physiographic, biotic, oceanographic and climatic regions/boundaries, coastal processes and natural resource values and uses.
- 2) Development and implementation of a "biophysical" inventory program for the coastal zone, requiring:
 - development, testing and application of inventory methodologies and classification systems;
 - coordination of current research and inventory
 - development of stronger liaisons between information-gathering and information-using agencies
 - identification of appropriate criteria (classification systems) for such interpretations as use capability, use suitability, impact sensitivity, and potential harvestability.
- 3) Assessment of the option for developing an integrated, computerized data management system for the coastal zone.

Products and followup

Three folios for selected areas on the southern BC coast were completed between 1979 and 1983.

The biophysical inventory program was never developed in a comprehensive fashion, although, some ad hoc efforts for small areas were attempted by individual agencies prior to the early 1980's.

In 1987 the BC Ministry of Environment and Parks carried out an internal analysis of Coastal Information Needs (refer to Appendix H).

In 1988 the Provincial Ombudsman produced Public Report No. 15 on *Aquaculture and the Administration of Coastal Resources in British Columbia*, which recommended that *an inventory of coastal resources. . .should be created as the foundation for coastal planning* [Recommendation #2(c)]. The original recommendation from the 1977 report was suggested as a good model for implementing this recommendation.

Appendix II: 1987 Survey of Coastal Data Producers/Users

Purpose

This survey was part of a study entitled: *Coastal Information Needs Analysis* carried out by the Coastal Information Working Group for the Aquatic Resource Information Steering Committee (ARISC).

The focus of the committee was to consider ways of coordinating and integrating coastal resource inventory and monitoring functions of the Ministry of Environment and Parks. Specifically, the survey was designed to: (i) identify the coastal data/information types used most frequently; and (ii) examine present availability, validity and reliability of coastal information.

Coastal information needs were identified within and across Ministry programs. Systems or applications needed to facilitate information collection, analyses and presentation were examined, as well as, other coastal information initiatives within the Province.

Survey Participants

Thirty-five "producers" and "users" of coastal information were surveyed within nine program areas in all coastal regions within the Ministry of Environment and Parks.

Results

Uses for coastal data/information were: referrals (responses to other agencies regarding proposals for Crown resource allocation or exploitation), and presentations (plans, impact assessments, technical reports/submissions, briefs) and other documents.

The survey found that the involvement of Ministry Programs in coastal resource management *per se* was low and ad hoc. It was recognized that technological advances have greatly improved the capability for sharing information between different users with varying needs. The main needs identified were:

- Preparation of a computerized directory of coastal data/information.
- Ensuring that coastal activities (inventory, impact assessment, monitoring, referral, facility siting, planning), related management responsibilities (water quality, wetlands, estuaries, recreational fisheries, parks and reserves), and the information/data to support them, are focussed and coordinated.
- Improving presentations and activities noted above, through use of graphic work stations (including plotter, digital table, colour monitor) to enable staff to have "hands-on" capability to map, chart and diagram coastal data and information;
- Using GIS to link data-bases with geographic locations on digital maps for improved coastal activities [planning and management of coastal resources/resource uses].

Recommendations

Among the recommendations of the 1977 survey report were requests for:

- Measures to ensure cross-program integration and encourage federal, provincial, and NGO sharing of data-base.
- Establishment of formats/standards for geo-referencing existing and future coastal data/information records.
- Development of a Coastal Information Directory.
- Installation of Graphic work stations utilizing GIS.

Products and followup

None of these recommendations were implemented as a cross-program/ministry product. The Environmental Emergency Services Branch and other programs/branches within the ministry have undertaken individual efforts to implement these recommendations, with varying degrees of success.

A 1988 paper on *Marine Environmental Quality in Canada: Status and Issues: The Pacific Coast of Canada* co-authored by the Ministry of Environment & Parks and Environment Canada; noted that the lack of a coordinated storage and retrieval system for marine and coastal data and information remained as one of the most serious problems hampering effective marine environmental quality monitoring and management. The lack of such a system also exacerbated the resolution of coastal resource use conflicts, habitat protection issues, and questions of health, toxic and hazardous chemicals, and other coastal resource protection issues.

Appendix III: 1992 Coastal Data/Information Survey

1. List of Respondents

B.C. Environment

- Environmental Protection
- Integrated Management
- Fish and Wildlife
- Water Management

Other Provincial Agencies

- BC Lands
- Royal BC Museum
- Agriculture, Food & Fisheries
- Energy, Mines & PR
- Nature Trust of BC
- BC Parks
- Tourism
- Archaeology
- BC Forest Service

Federal Agencies

- Maritime Forces Pacific
- DFO Science
- Environmental Protection
- DFO Habitat Management
- Parks Service:
- Wildlife Service
- Geological Survey
- Environmental Assessment

Consultants, Industry, Crown Corporations

- Juan de Fuca Environmental Consultants
- Environmental Services
- Hammond Bay Environmental Services
- DF Dickins Associates
- Hatfield Consultants

- Counterspil Research Inc.
- Fletcher Challenge
- BC Hydro
- BC Ferries

2. List of Other Products Produced

- Video
- Marine water quality criteria, assessment and objectives documents

3. List of Other Products Required

- Video
- Permit information

4. List of Other Uses of the Data

- | | |
|--|---|
| <ul style="list-style-type: none"> • policy development • spill response • major project reviews • regulations • habitat acquisition • operational planning • CRIS reports • public information • exhibits • public programs • marine water quality | <ul style="list-style-type: none"> • reports • decision making • permits • baseline inventory • litigation • scientific publications • Crown land strategy • site evaluation • handbooks • lectures |
|--|---|

5. List of Other Types of Coastal Data/Information

General Data

- | | |
|--|---|
| <ul style="list-style-type: none"> • airports/landing strips • climate data • area designations | <ul style="list-style-type: none"> • spill response depots • land use capability • sensitivity mapping |
|--|---|

Physical Data

- | | |
|---|--|
| <ul style="list-style-type: none"> • geology • minerals • aggregates • littoral area • stream discharge • biogeoclimatic zones • marine sediment types • marine sediment quality objectives | <ul style="list-style-type: none"> • shoreline processes/stability • sediment erosion/accumulation • current speed/direction [all depths] • location of stream mouths • watershed boundaries • shore terrain classification/ hazards |
|---|--|

Chemical Data

- toxicity
- contaminants
- nutrients
- ambient water quality
- marine water dispersion
- point/diffuse source discharge data/loadings
- microbiological indicator sites/data
- water quality sampling sites
- availability of water quality objectives

Biological Data

- critical habitats
- phytoplankton
- PSP monitoring sites
- habitat requirements
- fish/shellfish closures /habitat location & area
- rare/endangered species
- MEQ/SOE trend sites/data
- biological capability
- biophysical assessments

Human Use Data

- drinking water
- boating
- cruising
- nature appreciation
- land use zoning
- forestry/TFL reserves
- storm sewers
- ocean dump sites
- water intakes
- log dumps/storage areas
- pipelines [submerged]
- industrial facilities
- commercial operations
- marine camping
- other recreational sites
- wharves /floating moorage
- recreation capability
- agricultural land reserves
- outfalls [permitted /non-permitted]
- logging camps /construction sites
- finfish/shellfish mariculture sites
- marine vegetation harvesting sites
- residences with septic tanks
- waste permit locations/ amounts
- water licence locations /amounts
- present land/water use

Copy of the 1992 Questionnaire

Name: _____ Agency: _____

	COLLECTOR	USER	PRODUCTS PRODUCED				PRODUCTS REQUIRED				USES OF DATA				OTHER									
			REPORTS	MAPS	DATA BASES	GIS	OTHER	REPORTS	MAPS	DATA BASES	GIS	OTHER	BUDGETS	ACQUISITIONS	MONITORING	STRATEGIC PLANNING	REGULATORY PLANNING	SITE PLANNING	RESEARCH					
COASTAL DATA TYPES																								
<i>Derived Information</i>																								
GENERAL																								
Access																								
Weather Stations																								
Transportation Routes																								
PHYSICAL																								
Elevation																								
Bathymetry																								
Tidal range																								
Currents																								
Water temperatures																								
Substrate																								
Intertidal area																								
Shore type-intertidal																								
Wave exposure																								
Sediment transport																								
CHEMICAL																								
Salinity																								
Dissolved Oxygen																								
BIOLOGICAL																								
Fish																								
Benthos																								
Marine mammals																								
Seabirds																								
Vegetation																								
Habitat classification																								
Productivity																								
Resiliency																								
HUMAN USE																								
Aquaculture sites																								
Hatchery/SEP sites																								
Arch./heritage sites																								
Marinas/launches																								
Lodges/resorts																								
Charter operations																								
Communities																								
Parks/eco reserves																								
Indian reserves																								
Military/crown reserves																								
Commercial harvesting																								
non-comm. harvesting																								
Diving																								
Recreating																								
Anchoring																								
other recreational use																								