

THE CANADA LAND DATA SYSTEM: ITS ROLE & POLICIES
A DRAFT POLICY MANUAL
Discussion version
prepared by

W. Switzer
T. Fisher
E. Beaudette
M. Comeau
C. MacDonald

and

E. Snell
D. Belgue
J. Arbor
J. Senyk
J. Thie

CONTENTS:

1. BACKGROUND & PURPOSE
2. USERS
3. DEVELOPMENTS IN SPATIAL INFORMATION SYSTEMS
4. THE CLDS
5. GOAL AND OBJECTIVES OF THE LAND MANAGEMENT DATA PROGRAM
6. THE ROLE OF THE LANDS DIRECTORATE/CLDS
7. CLDS: NATIONAL COORDINATION & INTEGRATION ROLE
8. CLDS: PRODUCTS & SERVICES POLICY
9. CLDS: TECHNOLOGY TRANSFER POLICY
10. CLDS: MARKETING POLICY
11. CLDS: COST RECOVERY POLICY
12. CLDS: RESEARCH, TECHNOLOGY & DEVELOPMENT REQUIREMENTS
13. CLDS: PROGRAM ORGANIZATION & LANDS DIRECTORATE CORE SERVICES ROLE

THE CANADA LAND DATA SYSTEM: ITS ROLE AND POLICIES

1. BACKGROUND AND PURPOSE

There are many resource management agencies at the federal, provincial and local levels which use large volumes of maps to store and display information. This "spatial" information is handled primarily in conventional map format. In the mid 60's, the Canada Land Inventory Program introduced for the first time in Canada a computer approach to storing, analysis and display of mapped data. The computer program developed for the CLI is called CGIS (Canada Geographic Information System) and has been fully operational since 1972. A large spatial data base has been built and many reports have been produced with this system. This system forms the major component of the Canada Land Data System of the Lands Directorate, Department of the Environment.

The significance of the data base and the capabilities of the system allow the Lands Directorate to provide products, services, expertise and technology to a wide range of Canadian users. This discussion paper describes the role and policies of the federal government (the Lands Directorate) which guides the interactions between the CLDS and the user community.

2. USERS

Various user surveys have been carried out in the past years. Under contract to the CLDS, Tomlinson Associates provided a detailed profile of provincial users. The recent Program Evaluation carried out for the CLDS emphasized federal users, particularly in our own department. Together with the regional user profiles which have been prepared by our regional liaison officers, a clear picture of potential clients is emerging.

In general, spatial data is used in support of resource management, including management of forestry, wildlife, agriculture resources, land use planning activities, etc. Resource management is carried out by all levels of government (federal, provincial, regional, local) and private agencies/industries. The type of spatial information to be handled depends on the function in the resource management process it serves, (policy, program development, operational management etc.), and on the area of responsibility of the agency involved.

Those two factors influence the type of data to be handled and the computer systems approach that is needed.

Most federal organizations require data to be compatible across the nation usually at relative small scales (ie. 1:1,000,000), but covering a large area, primarily for policy and program development. A few federal agencies with land management responsibilities, such as the National Park Service, need considerably more detailed information in support of operational management and planning.

Urban municipalities require very detailed spatial data (scales between 1:1,000 and 1:10,000) for their planning and management activities. This information needs frequent updating and it needs to be uniform across the planning area, but not across the nation.

Somewhere in between those two extremes lie the requirements of provincial agencies (eg. scales of 1:20,000 - 1:50,000). Examples of typical users at these three levels are the Lands Directorate (federal), provincial forest inventory groups and municipal planners.

3. DEVELOPMENTS IN SPATIAL INFORMATION SYSTEMS

The type of data and computer data handling a user needs depends on the functions and responsibilities the user performs. Considering the wide differences between users of spatial data, it can be expected that "user" oriented computer systems will show significant differences in design and output. Since the user will either buy or develop "his" system, he will make sure that it satisfies his own needs first. In view of the specific user needs and of financial, organizational, jurisdictional controls and "ownership" of information it is generally accepted that a large number of, different user-oriented systems will be implemented during the next 5-10 years. These systems will reflect requirements for local control, local input and local output. The system will be required to handle many data sets, allow frequent updating, rapid input, flexible analysis and retrieval of information. As well, linkages with other spatial data systems are critical to provide information sharing and to satisfy the need for analysing and overlaying other data sets. The above are requirements dictated by the user and his objectives (ie. "user pull"). The developments in computer technology ("technology push") will make digital spatial data handling more cost-effective than it already is. Within about 5-10 years, minicomputers will be able to do much of the complex spatial data handling which now only run on large computers at present. By then CGIS software programs can be run on relatively small, locally controlled and located systems. As well, the cost of hardware will decrease and computers, drum scanners and interactive and output devices will come within financial reach of a large number of "smaller" user organizations. This will reinforce the development of

user-oriented systems, which are locally controlled.

The large clientele and superior cost effectiveness of computer data handling will cause an exponential increase in the use of spatial data system in Canada. Unfortunately, the developments in the technology are expected to take place primarily in the U.S. Much of the hundreds of million of dollars that will ultimately be spent on these systems will likely go south of the border unless Canadian private industry capability is available.

The federal government, so-far, has played a lead role in technology development of spatial information systems through its efforts in CLDS/CanSIS/CCRS/EMR TOP. MAP. Considering the rapid growth expected over the next ten years and the technology push from the south, the federal government should play a major role in technology transfer, either from federal organizations to provinces and private industry, or between provinces. An effective technology transfer and coordination role would facilitate the development of compatible systems and linkage mechanisms.

Some of the developments described have already taken place. A variety of systems have been developed in Canada using either a so-called grid, or polygon (vector) approach. As a general rule, systems requiring the handling of large volumes of spatial data tend to be vector based (CLDS/CGIS). Small volume systems tend to be of a grid nature (RRAMS; SYMAP). The new developments in the field of digital analysis of satellite remote sensing imagery require a raster approach. Whatever the situation is at present, it is expected that the major spatial data systems of the future will be able to handle vector as well as grid or point data.

4. THE CANADA LAND DATA SYSTEM/CGIS

History: The CLDS/CGIS was developed in the late sixties to assist in national, provincial and regional resource planning. Its development was part of the Canada Land Inventory Program, a federal/provincial cooperative effort. For the first 10 years, the primary client of the system was the Lands Directorate (CLI project); the Canada Land Inventory Map Series forms the major part of the 3,500 maps in the system. However, in the last number of years, use of the CLDS has been diversified considerably, including other federal agencies, provincial agencies and universities.

System Capabilities: The CGIS is a polygon-based system which uses an optical drum scanner to digitize map data. The system can handle point and line data as well as integrate with grid systems. A recent consultant report has described the system as uniquely efficient in the following areas:

- a) high volume input;
- b) regional, provincial and continent-wide analyses;
- c) map overlay, particularly of large or complex data sets; and
- d) expertise for spatial data handling.

The system is as efficient as or more efficient than other systems for a wide range of map measurements and analyses. It is not as efficient as others for small, one-sheet types of map handling, particularly if it is non-repetitive, concerns single site analysis or requires high levels of cartographic output.

Data input, analysis and output: Although the main operations of the CLDS is central in Ottawa, data input, analysis and output can be or is already regionalized. The main operation in Ottawa consists of a series of software programs running on a large main frame IBM computer (time leased through private industry). Input is by means of a drum scanner, with a capability to digitize up to 6,000 maps per year. In addition, a modified IDESS system (formerly Auto-map) provides digital input backup. Analysis of the data base is achieved through the use of interactive graphic terminals or special software programs. Output is in the form of digital tapes, reports and summary or visual displays of polygons through the use of graphic terminals, with hardcopy devices, plotters and various color display devices. Retrieval and analysis are regionalized through a series of interactive graphic terminals in Vancouver, (Winnipeg), Regina, Edmonton, Burlington, Quebec City, Halifax and St. John's. The capability exists for users to carry out input and analysis of their data in their own offices by obtaining a digitizing system and interactive analysis terminal.

Future Systems Development: The system has proven to have an extremely strong design philosophy and adequate transparency to adapt to three major generations of computer technology (Tomlinson Report). It can adopt economically to new technology developments over the next 10 years, and possibly longer. Continued research and development will take place to improve:

- 1) efficiency of input;
- 2) linkages with other systems;
- 3) improve "user friendly" character of the

- input, output and data analysis systems;
4) graphic output capabilities; and
5) raster processing systems.

Systems Cost: Estimate of total cost is \$12 million; this includes research, design, system development, hardware, software, plus cost of building the data base. The system contains 3,500 maps, of which about 66% were input since 1974 at an average cost of \$1,100.

Input Cost: As a result of improved efficiency, input cost has been reduced over the years. In 1978, average cost per map sheet was \$664. Present level of input is about 400-500 maps per year. Increase in volume could further reduce input cost to about \$500 per map sheet.

Analysis Cost: This ranges between \$10 and \$500 per map sheet, depending on the complexity of task and map.

Cost-effectiveness: Input and analysis cost are comparable to or lower than those for other systems, including those of the U.S. Time and cost-effectiveness is greatest with complex or high volume tasks. As well, it is a proven smoothly operational system.

Cost estimation and accounting: At present, for practical reasons, the number of polygons per map is used for estimating cost of input and analysis.

Products & Services Available from CLDS

Products: digital tapes with CLI, forestry, wildlife, recreation, land use, agriculture, and other information by country, province, watershed, census or administrative areas for the most heavily settled portion of Canada (about 2.5 million km²);
digital tapes providing CLI and other data in a grid format;
maps and reports displaying and summarizing areas and statistics derived from overlaying any of the CLDS data bases with each other; and
software programs, related to processing of spatial data.

Services: spatial data processing
a) digitizing of maps
b) building of data bases
c) manipulation of data bases.

advice and training

TABLE 1. COST ESTIMATES OF SOME SYSTEM CAPABILITIES

1. Data Input

Average direct costs per map sheet:	\$467
Average indirect fixed costs per map sheet:	\$204
Range of actual direct costs drawn from teh example of the Cape Breton Spruce Budworm Study is as follows:	
Low: (per map sheet containing low density of data)	\$164
High: (per map sheet containing high density of data)	\$605

2. Data Manipulation

Summary tabulations, table printouts:	
With standard software:	
With special user software:	Dependent on user requirements

Circle overlay on 4 map coverages (CLI Agriculture, Land Use, Shoreline and Census) (100-mile radius used as example):	
Graphics reduction (setting up for Graphics Subsystem):	\$150 to \$300
Terminal use (depending on skill of operator) per hour:	\$ 50 to \$200

Overlay operations:

a. Low density data set on high density data set (approximately 1,000 polygons)	\$150 to \$200
b. Medium density data set on medium density data set (approximately 2,000 polygons)	\$200 to \$250
c. High density data set on high density data set (approximately 3,000 polygons)	\$200 to \$250

Shoreline measurement (depending on length of shoreline)	
In Range of:	\$ 20 to \$ 50

Polygon to grid conversion:	\$ 50
-----------------------------	-------

Area measurements; scale change:

Separate Figures for these 2 manipulations not available as they are performed automatically as part of creation of the data base.

3. Data Output

Quick look plots, per plot:	\$ 2 to \$ 3
-----------------------------	--------------

Gerber plots, per hr., incl. labour (plotter pen moves at 42"/sec.):	\$ 40
--	-------

Colour proof (costs for 20" x 30" Red Deer Map Sheet 83A,
at 1:250,000 scale):

a. Production of colour proof print:	\$622
b. Materials used:	\$446
Total cost:	\$1,068

DICOMED plot (costs for Red Deer Map Sheet 83A)

Preparation of tape to be sent to DICOMED:	\$ 36
--	-------

(additional costs for production not yet available; presently
provided free of charge to CGIS)

5. GOAL AND OBJECTIVES OF THE LAND MANAGEMENT DATA PROGRAM

The 1980-81 Lands Directorate program plan describes the objectives as follows:

Goal: To develop, maintain and operate a national land data bank; provide spatial data processing services and advice; and advance the state of knowledge on the capabilities and applications of spatial information systems in land use planning and management.

Objective: National Land Data Bank. To develop, maintain and operate a computerized national land data bank capable of storing, processing and retrieving geographic-specific ecological and socioeconomic data on or related to land, land capability, land use and resource management issues of national or regional significance.

Objective: Data Processing & User Services. To provide data processing and advisory services in support of the production of land statistics and the solution of land and related resource planning and management problems; and to provide training services on the use of the Canada Land Data System for existing and potential clients.

Objective: Spatial Information Systems Research. To develop, assess, improve and recommend computerized technologies designed to enhance the effectiveness, efficiency and greater use of spatial information systems in land use planning and management.

6. THE ROLE OF THE LANDS DIRECTORATE/CLDS

The role of the Lands Directorate is controlled by the mandate of the federal government and its policies on the one hand and the need of the user group on the other hand. A third factor influencing the role are the developments that take place in computer technology.

Spatial information systems will experience an exponential growth in the next decade. The reduction in cost of computer hardware will drastically improve cost-effectiveness of information systems, allow more complex analysis and enable the development of a variety of systems to satisfy various user needs.

Significant investments in hardware purchases and software development will be made by a large number of federal, provincial and private agencies to reduce costs of conventional data handling and to respond to the increasing complexity of environmental management. In view of the strong needs for user orientation and local control of information systems, it will be important to avoid duplication of effort in research, development, acquisition and implementation of information systems. The Lands Directorate can play an important role in this regard.

At present, the Lands Directorate operates the most sophisticated and "experienced" geo-information system in Canada (if not in the world). In doing so, it has built up a unique expertise in data handling, but also built one of the largest digital resource data bases in the world today. This unique position creates some special responsibilities for the Lands Directorate, related to the transfer of technology and expertise to the provinces and private industry in Canada; it provides an opportunity to influence, speed up implementation of computer technology for resource management. As well, Lands Directorate might be able to play a role in the building of a private industry capable of competing with firms from the U.S. for a future, lucrative Canadian and international market

To support the core activities of Lands Directorate (and Department of the Environment) the CLDS has as one of its objectives the building of a national land data bank on land related information for national perspective studies and in support of environmental impact assessment. This requires the CLDS to integrate and aggregate land and ecological data from a variety of sources and systems (federal, provincial, etc.). The development of linkages (technological and administrative) between the CLDS and other information is basic to satisfying this need.

Considering the above discussion, the following roles have been identified for the Lands Directorate/CLDS:

1. Coordinating and integrating role between federal and provincial agencies, universities and private industry to provide for information exchange, avoid duplication of effort, encourage information sharing and development of system linkages.
2. Providing products and spatial data processing services to clients (federal, provincial and others).
3. Transferring technology (software programs and expertise) to provinces and private industry.
4. Supporting programs of the Directorate and the Department by:
 - a) building a national land data bank;
 - b) providing spatial data bank services to departmental programs; and
 - c) providing integration and analysis of complex data for national perspective studies and environmental impact assessment
5. Conducting and encouraging R&D in spatial data processing and its applications to resource management and conservation.

The purpose and guiding policy for each of these roles are discussed in the following sections. As well, actions are presented to achieve the purpose identified in the various roles or policies.

7. CANADA LAND DATA SYSTEM: NATIONAL COORDINATION & INTEGRATION ROLE

Purpose: To achieve greater cooperation between federal agencies, the provinces, universities and private industry in the research, development and implementations of spatial resource management information systems in Canada.

Policy: The purpose will be achieved by carrying out a coordination and integration role. Coordination and integration are defined in this context as organizing or supporting initiatives which act as catalysts and foster information and expertise exchange, cooperative programs, data sharing, development of linkages between systems, etc., in other words fostering voluntary cooperation and integration efforts between federal, provincial, university and private sectors.

Procedures: Headquarters and regional staff of the Lands Directorate will:

- 1) organize or sponsor national and regional workshops, meetings and committees related to spatial data processing;
- 2) carry out informal liaison activities through their normal contacts with representatives of other information systems and user groups;
- 3) establish or contribute to newsletters (ie. Lands newsletter, CCELC or others) as a vehicle for information exchange; and
- 4) keep an up-to-date listing of data systems in use and prepare brief comparative descriptions of each system.

Implementation

Fiscal year 1980-81:

- 1) Director, Land Data and Evaluation Branch, in cooperation with the provinces will organize a national workshop in the fall or early winter.

Objectives of the workshop would be to:

- a) discuss the present status of Resource Management Information Systems in Canada;
- b) outline developments which will take place in the various provinces, regions/agencies over the next decade;

- c) explore the need for cooperation, linkages and information sharing between the various agencies; and
 - d) discuss the need, objectives, organization and modes of operating of a permanent national coordination committee (eg. Can. Comm. on Resource Information Systems - CCRIS).
- 2) Publish in late spring or early summer of 1981 the workshop proceedings: The present status and future development of Resource Management Information Systems in Canada.
 - 3) Contribute a number of small writeups for the CCELC and Lands newsletters related to the use of CLDS for UCR studies (Quebec); International Joint Commission work (Ontario); Forest Inventories (Atlantic).
 - 4) Continue publication and updating IGU summary listing for Canada.

Fiscal year 1981-82 and further-years:

Provide secretariat to the CCRIS (if established), and assist it with organizing workshops and meetings, publishing of workshop proceedings, supporting newsletters, etc.

8. CANADA LAND DATA SYSTEM: PRODUCTS AND SERVICES

Purpose: To act as a service bureau and provide spatial data handling and land data base products and services to the Department of Environment, other federal departments, and provincial and private agencies in accordance with the CLDS cost-recovery policy.

Definition: Products include digital tapes (descriptive and image tapes) maps and data reports. At present this includes digital tapes, reports and maps from the National Land Data base such as CLI, (forestry, wildlife, agriculture, recreation, land use, sportfish data) and overlays related to watersheds, administrative areas (census areas, electoral areas, municipal areas etc.) and client data bases. Spatial data processing services are operations such as:

- 1) digitizing of maps;
- 2) building spatial data bases;
- 3) manipulation, analysis of spatial data;
- 4) specialized spatial software programs; and
- 5) advice on spatial data processing.

Policy: Products and services will be provided to federal, provincial and other clients in accordance with the CLDS cost-recovery policy. To reach a wide range of users, products and services will be advertised widely. Major potential clients will be informed by regional liaison officers about services available from the CLDS and the possibility of demonstrations and cooperative projects. Although every attempt will be made to serve all clients, priority of service will be dictated by federal responsibilities in this field as expressed through the mandate and priority of the Lands Directorate and EMS program evaluations, including directives received from the Zero-A-Base reviews (1979). The general order of priority will be: 1st, Department of Environment agencies; 2nd, other federal agencies; 3rd, provincial agencies; 4th, others such as private and university organizations. Priorities of request from federal, provincial and other agencies may increase whenever they support directly or indirectly, fully or partially Lands Directorate objectives and interests.

The CLDS will attempt to service all requests for products and spatial data processing services within an agreed-upon time frame. This may require the hiring of short term contract staff at a cost to the the client.

For major services, formal agreements between the CLDS and clients are required.

Procedures:

- 1) The CLDS will market its services actively through its staff in Headquarters and the regional liaison officers to increase the number of user agencies. The CLDS marketing policy will be reviewed annually and a national marketing plan prepared. The marketing approach should give emphasis to federal users and to provincial users with large spatial data handling requirements and users who generate data of national significance.
- 2) All CLDS services to clients should be reviewed (re feasibility, cost-recovery, priority, etc.) and approved by the Director, Land Data & Evaluation Branch in consultation with the Chief of the CLDS Division and Lands Directorate Management Committee.
- 3) The CLDS Division and regional CLDS officers, will prepare annually a 2 year user service plan which describes firm and anticipated service commitments and expected services in relation to resource requirements and cost-recovery aspects.
- 4) Products will be provided to clients on a cost-recovery basis. Price will be based on replacement costs. A selection of "off the shelf" products will be made by CLDS staff and regional liaison officers. First priority will be given to maps, reports and computer tapes which utilize existing land data base information.
- 5) Spatial Data Processing Services will be provided in accordance with the CLDS cost-recovery policy. Regional and HQ staff will propose service projects to their regional and HQ Directors and recommend cost-sharing or work-sharing arrangements. The Chief of the CLDS Division will evaluate proposed projects on feasibility, timings, priority and conformance with CLDS policy on cost-recovery. Approval will be delegated to the Director, LD&EB; in conflict situations, decisions will be made by the Lands Directorate Management Committee.

- 6) For approved projects accurate cost-estimates will be prepared by staff of the CLDS.
- 7) Formal agreements between the CLDS and the client are required in cases where large and extended amounts of services are required.

Implementation: Fiscal year 1980-81

- 1) Regional and H.Q. staff will develop a priority list for "off the shelf" standard products which should be made available. This includes:
 - a) CLI - digital tapes;
 - b) CLI - CLDS reports; and
 - c) CLDS raw data reports.
- 2) Products and services will be advertised through brochures, movies, slide/tape shows and other appropriate means of advertising to increase the clientele.
- 3) EMS programs (national and regional components) which require significant spatial data handling or spatial land resource evaluation will be analysed and proposals for services made (ie. Baseline program; River basin planning; FEARO; etc.).
- 4) Regional liaison officers will select and propose a small number of demonstration projects to demonstrate to major potential clients the effectiveness of CLDS services and data base.
- 5) Regional liaison officers will participate in and carry out applications research and development projects to improve CLDS services and products and to increase client awareness of those services and products.
- 6) Regional and HQ officers will continue to provide services and support to established clients.

9. CLDS TECHNOLOGY TRANSFER POLICY

Purpose: To transfer technology acquired by the CLDS in the field of spatial data processing, data base management, and applications to provincial and university agencies and private industry to maximize benefits to Canadians from the considerable investments in and expertise from the Canada Land Data System.

Definition: "Technology transfer can be viewed as the generalized process of information transfer between science, technology and actual utilization of scientific ideas. Wherever systematic rational knowledge and experience are developed by one group or institution is embodied in a way of doing things by other groups or institutions, we have technology transfer".

Technology transfer refers both to hard technology (hardware devices and software programs) and soft technology (inventive ideas and know how needed for the implementation of such ideas).

Policy: The Lands Directorate/CLDS will adhere to the requirements outlined in Cabinet Document 140-78 RD and the EMS - Technology Transfer Policy as finalized in December 1978 and amplified in a letter from D.M. of DOE to the Secretary of MOSST (Feb. 20, 1979).

Procedure: 1) The Director, Land Data and Evaluation Branch will:

- a) ensure, where possible that hard technology developed in or for the CLDS is made available to other government agencies and private industry;
- b) decide on the best method(s) of making other agencies and industry aware of the technology which has been developed in the CLDS; and
- c) ensure that if a contract or agreement is necessary to transfer technology, this is completed prior to the transfer and through the appropriate section of Government (eg. DSS).

2) In general, the following conditions will apply to the transfer of software developed for the CLDS:

- a) The software will be available at the cost of duplication and documentation. Cost related to implementation and maintenance will be fully charged to

charged to the user. The user will be encouraged to carry out those tasks himself.

- b) Any agency that accepts the software must agree to provide sufficient resources to keep the system viable and must also agree: to provide the Lands Directorate with any software developed to enhance, modify or change the system; to provide the Lands Directorate with copies of any publications generated on the software, such as documentation, or reports with respect to the use of the system; to provide the Lands Directorate with copies of any research either on software or in applications which make use of the system.
- c) Any changes requested by an agency to modify or change the software will be cost-recovered by Lands Directorate if the work is done by the Directorate.
- d) If any changes are made by anyone outside the Lands Directorate to the software, then the Lands Directorate will entertain the correction of bugs in that software at full cost to the client.
- e) The software cannot be distributed by a receiving agency nor can any royalty, fee, etc. be charged to any party for use of access to the software.
- f) An agency will enter into a transfer agreement that adheres to this policy.

3) Soft technology will be made available to other government agencies and private industry through:

- a) Education; lectures as part of regular university or extension courses; lectures to user agencies; preparation of demonstration materials (audio-visual, reports etc; displays) organizing workshops for potential users.
- b) Advice to agencies which want to implement or modify spatial data processing systems.
- c) Training for agencies which are implementing or using CLDS based systems.
- d) Staff secondments or interchange Canada arrangements or special assignments with agencies which are implementing spatial data systems to which CLDS expertise can make significant contributions.

Items a, b and c will likely be provided at no or minimal cost to the user agency involved; item d will have to be negotiated and users are expected to reimburse the department for all cost.

Implementation: Fiscal year 1980-81

1. The Director, LD&E and Chief, CLDS will prepare a plan for the transfer of "hard" technology to
 - a) industry
 - b) provinces.This plan will use the concept that software programs developed for the CLDS will be available at the cost of proper documentation and maintenance (if required). All other implementation costs will be the responsibility of the client. The plan will use the concept that Canada should build a computer industry capable of competing with U.S. firms in Canadian and international markets. After approval by Lands Management Committee, the Director, LD&E will be responsible for negotiations and implementations.
2. Regional and HQ staff will actively pursue education, training advice roles for agencies or institutions which handle of spatial data and consider or should consider the use of computer systems.
3. H.Q. and Regional staff will prepare and contribute to a major publication on the CLDS, its systems and uses and write reports and papers (including symposia and journals).

10. CLDS: MARKETING POLICY

Purpose: To increase awareness and the use of CLDS systems and data base by agencies which have large spatial data handling requirements and for which the CLDS would offer increased effectiveness and/or reduced cost.

Definition: In the context of this policy, marketing means to increase potential client awareness of the products and services available from the CLDS. Marketable products and services are listed in the CLDS Products and Service Policy.

Policy: The Lands Directorate will market its products to the widest possible range of users in Canada. The need for spatial data handling services can be identified at federal, provincial, regional and local levels of government, and private industry. Although the spatial data handling needs may be greatest at local and provincial levels, the CLDS, by virtue of its mandate and financing, is directed to market its services:

- first, to the Department of Environment and other federal departments;
- second, to provincial agencies with large spatial data handling needs; and
- third, to other agencies with large spatial data handling needs.

In the second and third instance, one objective of the marketing approach should be to encourage those agencies to establish their own system. CLDS services can be provided in the interim in accordance with the CLDS cost-recovery policy.

Procedures: 1) Each year, CLDS HQ and regional staff will prepare and evaluate the results of marketing efforts in the past year, prepare a marketing plan for the following years and review the marketing policy.

2) The marketing plan for each fiscal year should include regionally and nationally identified government or private agencies which should be considered prime candidates for marketing efforts. A marketing approach should be identified for each prospective client. The approach may vary from providing lectures and personal advice to cooperative or demonstration projects, etc.

3) Results of efforts with clients will be documented for annual review and evaluation.

Implementation: Fiscal year 1980-81

- 1) Prepare report on regional and HQ user profiles.
- 2) Prepare regional and HQ marketing plans and select priority clients.
- 3) Define marketing approach for selected clients.
- 4) Prepare marketing material ie. audio-visual show, carry out selected CLDS data base analysis, contribute to reports on CLDS , its system and uses, with application reports.
- 5) General promotional activities.

11. CLDS COST RECOVERY POLICY

Purpose: To recover cost of products, services and technology provided to client agencies according to:

- 1) DFE Directive on Revenue and Cost Recovery.
- 2) EMS Policy on Cost Recovery - EMS Responsibilities.
- 3) EMS Policy on Cost Recovery: Cost Recovery Procedures.
- 4) Special Agreements made between the Government of Canada and client agencies.

Definition: The following are defined in the DFE Directive on Revenue and Cost Recovery and will not be repeated here:

- Government of Canada
- Private Sector
- Direct Costs
- Indirect Costs
- Incremental Costs
- Vote-Netted Revenue
- Non-Tax Revenue

Critical to the CLDS cost recovery policy are the definitions of Core Services and Special Services. They are given below as interpreted for CLDS activities.

Core Services: Products and services (including advice) produced by the CLDS that in the opinion of the Minister are provided to the public generally. The CLDS core services are dependent on the role mandate and priorities of the Lands Directorate. Therefore, Core Services should be generally interpreted as those services which the CLDS provide in support of the Lands Directorate programs; (ie. Lands Directorate (Reg. & H.Q.) run research projects, land surveys, and Lands Directorate contributions to integrated programs and projects, baseline programs, EARP, building of the National Land Data Bank, etc.

Special Services: Products and services produced by the CLDS that in the opinion of the Minister are not provided to the public generally. Usually these services are provided over and above the Lands Directorate program requirements. Most CLDS services will fall under this category; clients of special services can be other components of the Dept. of Environment, other federal departments or

private agencies and institutions.

Policy: (1) Core Services: The CLDS shall provide core services without charge in Canada.

(2) Special Services: The CLDS shall charge all users for special services provided unless the users provides similar services of at least equal value in exchange which are employed by the Directorate to provide core services; for example, the digitization of Quebec 1:50,000 updated land use maps in Urban Centered Regions or the storage of Alberta Inventory maps, complementing the CLI data base.

(3) Basis of Charges: a) For special service as provided to the organizations of the Government of Canada, the CLDS shall charge for incremental cost only. Incremental cost will include increased cost in O&M, capital resources and manpower if acquired on contract or overtime related to providing the special service. b) For special services provided to the private sector in Canada, including Provincial Governments, the CLDS shall charge for all direct costs plus indirect costs of the Department. When equivalent or similar services are available from the private sector suppliers, the CLDS shall charge for all direct and indirect costs or the market level price for the service, whichever is greater. If the client provides services in return which contributes totally or partially to Lands Directorate core responsibility such as the building of a National Land Data Bank, Monitoring of Land Use Change, Land Use Research, Ecological Land Research, etc., the amount of cost recovery shall reflect the total cost of the services reduced by the value of the information supplied by the client for the Lands Directorate. The Director, Land Data & Evaluation Branch, will be responsible for assessing the value of return services provided, in consultation with Lands Directorate Management Committee if required. c) Special Agreements made between the Government of Canada (Lands Directorate) and clients related to cost-sharing or work-sharing arrangements or cooperative endeavours which are to the advantage of the Lands Directorate in relation to its responsibilities, may control actual cost recovery rates. For example, special services provided to provincial governments as related to the Canada Land Inventory program may be provided on a 50-50 cost sharing basis. d) Demonstration projects or pilot projects used to demonstrate to a potential client the utility of using the

CLDS for spatial data handling and analysis, may be considered wholly or partially core services for the amount the projects satisfy the Directorate's responsibilities related to technology transfer and marketing of services.

Accounting for Revenues:

(a) From Government of Canada Organizations

Revenues received for services provided to organizations of the Government of Canada shall be vote netted. Where projects of a continuing nature (more than one year) are carried out on behalf of another government department, the funding must be handled by vote netting in Main or Supplementary estimates. All costs relevant to these projects must be included in estimates by sub activity, standard object, etc. (Salaries, Operating, and Capital). Charges are then made against your applicable appropriation (O&M or Capital) using the appropriate code vote, collator, cost code and line object. Special coding should be set up to identify expenditures and other transactions for each project. Recoveries to the vote would be made using either ISA's or source 050 inter-departmental journal vouchers.

Where a project is carried out on behalf of another government department for the first year of a proposed continuing program not known at the time of preparation of main estimates or on an ad hoc basis, an O.G.D. suspense account must be used. Authority to undertake such work is normally in the form of a financial encumbrance, commitment authority, memorandum of understanding, etc. Refer to chapter 5, subject 5.2.11 of the Financial Directives Manual for the procedure on O.G.D. suspense accounts.

(b) From the Private Sector

Revenues received for services provided to the Private Sector shall be credited to Non-Tax Revenue. Where a project is carried out on behalf of a third party on a continuing basis, the main estimates should be increased by an amount equal to the estimated cost of the project. All costs relevant to such projects must be charged against the applicable appropriation (O&M or Capital) using the appropriate code vote, collator, cost code and line object. Special coding should be set up to identify expenditures and other transactions for each project. Recoveries must be

deposited to the consolidated revenue fund.

Where a project is carried out on behalf of a third party for the first year of a proposed continuing program not known at the time of preparation of main estimates or on an ad hoc basis, a suspense account similar to the O.G.D. suspense account would be used. Authority to undertake such work is normally in the form of a memorandum of understanding or similar document. Third parties must pay in advance of the work being done while recoveries from other government departments are usually made as work progresses or after the project has been completed.

- (c) All recoveries not falling within the aforementioned categories must be deposited to the consolidated revenue fund.

Budgeting for Special Services

The special services to be provided, the charges to be imposed and the expected revenues to be derived from these charges shall be forecast for the Program Forecast each year. This forecast shall form the basis of changes to the fee schedule.

Funds required to cover the costs of providing special services shall be obtained through Main Estimates. Such funds may not be used for any other purpose without the approval of Treasury Board.

When the level of special services provided exceeds the original forecast so that funding of costs is inadequate, additional funds shall be requested through Supplementary Estimates.

Implementation: Fiscal year 1980-81

- 1) Contracts with Bureau of Management Consultants to evaluate and advise on accounting procedures in the Lands Directorate.
- 2) Contract with Binarius Inc. to develop software for an automated cost accounting system for the CLDS.
- 3) Develop list of charges for "off the shelf" products and standard services.

- 4) Prepare forecast of special service to be provided during 1981-82. This forecast will be used to obtain funds to cover the cost of providing these special services through Main Estimates.
- 5) When the level of special services provided in 1980-81 exceeds \$50,000, additional funds will be requested through Supplementary Estimates.
- 6) Expenditures and revenues related to special services will be included in the Financial Accounting Computer System (FACS) listings.

12. CANADA LAND DATA SYSTEM: RESEARCH, TECHNOLOGY & DEVELOPMENT REQUIREMENTS

Purpose: To develop, assess, improve and recommend computerized technologies designed to enhance the effectiveness, efficiency and greater use of spatial information systems in land use planning and management.

Background: The main component of the CLDS, the CGIS, was developed in the mid-1960's. It has a strong design philosophy and was adapted to three major generations of computer technology. It can adapt economically to new technology and remain in the forefront of spatial data processing over the next decade with reasonable efforts in R&D and investments in hardware. The present operational demands on the system do not allow adequate R&D and hardware "rejuvenation" to take place and consequently a "stagnation" in efficiency may result compared with developments in computer technology. A selective effort in R&D and technology adaptation should take place to enable the CLDS to remain the most effective federal spatial data handling system. The following areas of R&D and technology adaptation have been identified for the CLDS over the next number of years:

- 1) improve efficiency of input;
- 2) develop linkages with other systems;
- 3) improve user friendly character of the input, output and data analysis components;
- 4) improve graphic output capabilities;
- 5) adapt system to handle raster data; and
- 6) develop capabilities to handle line data
- 7) develop capabilities to generate digital terrain models;
- 8) develop capabilities to allow or enhance regional input and retrieval; and
- 9) develop capability to handle most common map projections.

Approach: In addition to the limited in-house resources available to CLDS, research and development will be encouraged through:

- a) using qualified post doctoral fellows in spatial data processing; and
- b) encouraging university research in spatial data processing for resource management by supporting university staff and graduate students, through small

contracts and/or making available the capabilities of the CLDS at no cost, or cooperative research projects.

To adapt to changing technology in spatial data processing, such as developments in micro-processing, satellite image analysis systems and drum scanners and to replace obsolete hardware, the CLDS require greater capital resources. To achieve this, two approaches will be considered for 1981-82 and following years.

- 1) Include in main estimates for special services to the private sector a significant capital component to purchase equipment which is essential to the provision of services and R&D in support of those services.
- 2) Prepare special submissions for acquisition of major hardware components required for the system including, when appropriate and timely:
 - a) drum scanner;
 - b) satellite analysis and display equipment;
 - c) Regional input and analysis and display devices;
 - d) minicomputers to support R&D functions; and
 - e) replacement of existing equipment.

13. CLDS: PROGRAM ORGANIZATION & SERVICES TO THE LANDS
DIRECTORATE

Note: This section was not discussed with other members of the Policy Committee. Since about 80% of CLDS services are provided to the Lands Directorate itself, a policy should be formalized with regards to the procedures to be followed by users and suppliers. This statement is written with the purpose to generate reactions for the formulation of those procedures.

Policy: The CLDS will give priority to providing Lands Directorate Core Services in line with approved Lands Directorate and CLDS program plans. Services to be provided over and above those identified in the program plan will be reviewed individually for approval and priority by Lands Management Committee.

Procedures:

- A. A CLDS program forecast and plan will be made annually defining CLDS services required for each study, project, activity element undertaken by the Lands Directorate. This program forecast is the responsibility of the Chief CLDS. It will be a roll up of Regional and HQ submissions concurrent with the departmental program planning and budgeting cycle and will be submitted to Reg/HQ Management Committee for review, approval and assignment of priority.
- B. A Lands Directorate research officer requiring CLDS services for new research projects, which are not part of the program plan, should take the following steps:
 - 1) outline project/study requirements as precise as possible;
 - 2) discuss with regional liaison officer or HQ CLDS staff feasibility, cost, scheduling etc.;
 - 3) prepare proposal for approval by Division Chief and Director;
 - 4) Director will submit proposal for consideration to Chief CLDS;
 - 5) Chief CLDS will schedule service; if conflicts arise he will consult with Director LD&EB and Management Committee re priorities;
 - 6) Request for services which are in excess of the amount budgeted for in the annual program plan for the cost centre, project or activity element will have to be reviewed by HQ Lands

Directorate Management Committee, for approval and assignment of priorities.

- C. Although the CLDS services to the Lands Directorate are core services, and do not require transfer of funds, shadow billing will be provided to the project leaders, division chiefs, and branch Directors to allow tight financial control of the projects.

Organization: The following "actors" contribute to the program; their responsibilities as related to CLDS are briefly described.

- 1) Director-General, Lands Directorate
 - responsible for all Lands programs;
 - will carry out annual evaluation of cost-recovery arrangements, cost-sharing projects, marketing, client service and R&D for CLDS.
- 2) Director Land Evaluation and Mapping Branch
 - Overall management of the HQ component of the Land Management Data Program;
 - responsible for program forecasts, technology transfer strategy, policy development; federal-provincial coordination committee; approval of special services and cost or work sharing arrangements, in consultation with Chief, CLDS and Regional Directors.
- 3) Regional Directors
 - responsible for the regional component of the LMD program; will recommend work or cost-sharing arrangements with other parties; will submit annually to Chief CLDS a plan for CLDS services required for in-house projects, cooperative projects with other agencies; will submit for their region a forecast of expected special services to clients and recommend cost-sharing arrangements, national Land Data Bank input and R&D.
- 4) HQ Chiefs
 - will submit annually through their Director, to the Chief CLDS a forecast of services required for in-house research projects or cooperative projects with other agencies.
- 5) Chief, CLDS
 - responsible for management and operation of the CLDS division operation and maintenance of CLDS systems, National

Land Data Bank, including provision of special and core services; on the basis of regional and HQ forecasts, will prepare a summary program forecast for core and special services (committed and expected); prepares a forecast of cost-recovery of special services to be included in the main estimate; responsible for costing, cost-accounting, scheduling of services, responsible for liaison with Regional CLDS officers and coordination of services nationally; chairs a HQ/Regional CLDS Coordination Committee; will develop with Regional CLDS policies and strategies on the provision of CLDS services; R&D; publications etc.

- 6) Regional CLDS Officer
 - is responsible for:
 - regular regional user surveys;
 - development and implementation of regional marketing plan in line with national strategy; coordinating between clients and the CLDS on special services and cooperative projects, recommending cost-sharing formulas, evaluating results and publishing reports and papers on these projects; developing research and application project as demonstrations using the CLDS data base for analyzing land resource issues of regional concern; participating as research officers in Lands Directorate or cooperative projects with other agencies requiring expertise and services in spatial data analysis; organizing, participating and contributing to regional workshops, meetings, committees on the use of spatial data systems; Compiling annually a list of CLDS Core Services required for Regional Lands projects; Prepare annual forecasts for special services to be provided by the CLDS for the region.
- 7) Regional and HQ Research Officers
 - are responsible for forecasting, and defining, as accurately as possible services required by the CLDS for approved and proposed projects. These are submitted to Division Chiefs or Directors for approval and submission to the CLDS.

- 8) CLDS Section Heads
- responsible for delivery of services to users; providing cost estimates, progress; initiating R&D; maintaining national land data bank; providing technical advice and training; technical liaison with other data systems etc.

9) LANDS DIRECTORATE CLDS COMMITTEE:

Purpose: To coordinate the Lands CLDS program and develop and recommend strategies and policies on CLDS like, marketing, services to clients, technology transfer, R&D etc.

Members: Chief, CLDS (Chairman), Director, LD&EB; CLDS section Heads, Regional CLDS officers; group leaders.

Meeting: One or two times per year. A sub committee, composed of Chief CLDS and Regional CLDS officers, will meet more frequently to coordinate HQ/Regional Services.

Reporting: To Regional HQ Management Meeting.