Planning Sustainable Communities

A focus on community mapping case studies from the Lower Mainland and Sunshine Coast of British Columbia

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A compilation of community mapping case studies from the Lower Mainland and Sunshine Coast of British Columbia, prepared for the Planning Sustainable Communities Workshops

Sponsored by

The Township of Langley
The Community Mapping Network
(a partnership of community and government conservation agencies in British Columbia)
Fisheries & Oceans Canada Habitat Conservation and Stewardship Program
Sunshine Coast Regional District

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The Environmental Setting

The value of maintaining healthy functioning sensitive habitats in British Columbia — urban and rural watercourses, riparian areas, wetlands, foreshores and nearshores — is poorly understood. This means species at risk and sensitive habitats are under constant threat from urban and agricultural development. It may also mean that development proposals received by municipalities are often reviewed without adequate knowledge of the location or value of sensitive resources, either because the information has not been inventoried, or it may not be presented in the appropriate scale needed for land use planning.

We know that human activity and populations are increasing in British Columbia. More people increase the stress on sensitive ecosystems by bringing more houses, cars, industry and farm animals — but they cannot bring more land, air or water to our communities. We must understand that natural resources are finite, and that it is essential that community and land use planning efforts incorporate the value of sustainability — as it is the ecosystems of the earth and the services they provide that are the foundations of a healthy economy and social well being.

Population growth within the Georgia Basin of British Columbia is expected to double in the next 20 years. For this reason, ecologically sensitive areas such as floodplains, riparian corridors, small stream channels and wetlands may be severely affected by development unless there is strong community stewardship, awareness and effective land use planning.

Streams and other freshwater watercourses are a critical component to the health, vitality and economies of the urban and rural landscapes of British Columbia. They not only contain the runoff for water downhill, but also provide critical habitats and corridors for fish and wildlife. In coastal B.C. small streams and watercourses provide critical spawning, rearing, over-wintering and feeding habitats for both adult and juvenile salmonids. These environments are also home to many other species of fish, aquatic invertebrates, benthic organisms, wildlife and plants, all of which function as a part of the freshwater community and the entire ecosystem.

Conditions in and adjacent to streams are easily disturbed, and changes in land use can adversely affect the overall health and state of the streams and watercourses and the plants and animals within them. Housing, industry and road development often result in disturbance to watercourses, leading to the decline and alteration of surface water runoff, stream channel stability, watershed-based nutrient cycles, other organic and inorganic constituents, riparian vegetation, in-stream vegetation, and water temperature and flow regimes. These forms of disturbance can cause dramatic changes in ecosystem biodiversity, population status and the form and function of watersheds and ecosystems. For example, in British Columbia's Georgia Basin, numerous coastal salmonid stocks and populations of 29 wildlife taxa are at risk of extinction (red or blue listed) and are rapidly declining in

abundance due to loss of sensitive habitats which are vital to sustaining populations.

Recent studies[1] reveal that at least 30% of small urban streams and watercourses in the Georgia Basin of British Columbia are not delineated on provincial or federal topographic maps and databases. This appears to be typical in many regions and local municipalities. Local cadastral and planning information can often be dated and not capture recent land use changes, while large-scale inventory maps of streams and adjacent habitats are often not available as a means to identify sensitive habitats for fish and wildlife. As a result, many plan-

ning and development decisions continue to be made in the absence of critical information.

Good land use planning and decision making require accurate, precise and recent spatial habitat information. Accurately inventoried and delineated small urban and rural watercourses, wetlands, and riparian areas will help improve current land use planning processes and promote decisions made through greater understanding, improved planning practices, heightened protection and clearer priorities for fish and wildlife habitat restoration and enhancement.
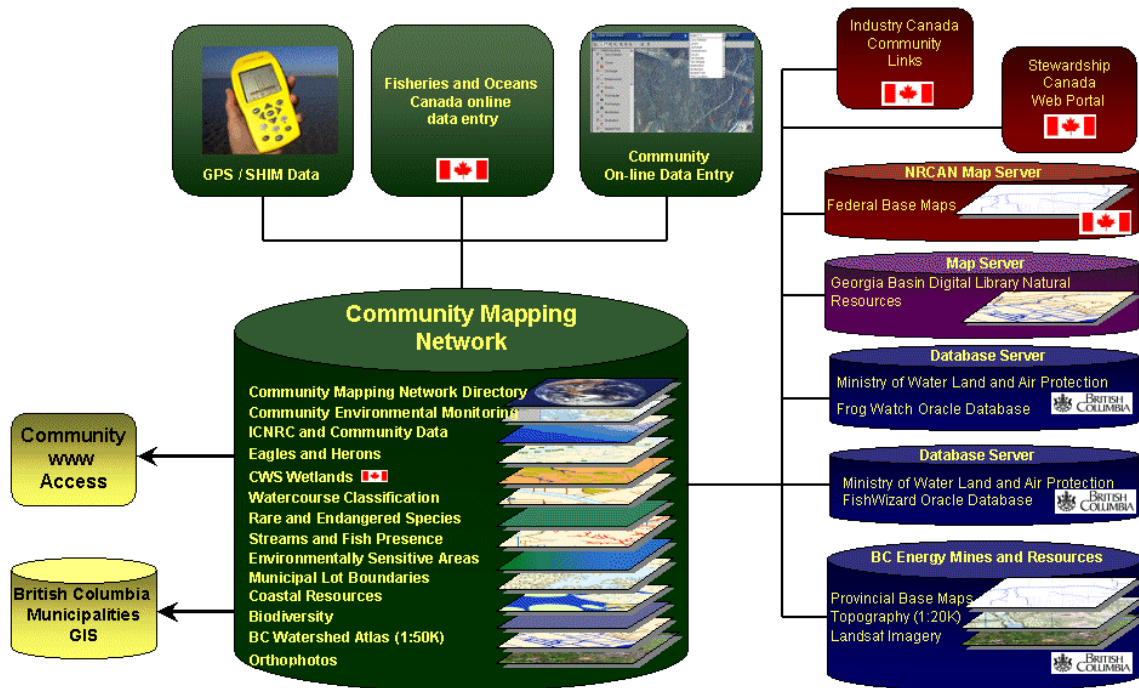

Figure 1. The Community Mapping Network data model

The Community Mapping Network (CMN)

Over the last decade lower costs and accessibility of mapping technology have made it

possible for local conservation groups and local governments to develop map-based tools for sustainable land use planning. In British Columbia the Community Mapping Network (CMN) is being built by contribu-

tors and users interested in creating accurate resource data accessible through the internet. The CMN integrates data from government and non-government sources and makes it accessible through a user-friendly mapping system.

The CMN encourages building expertise locally, sharing ideas so as not to reinvent the wheel, and linking all community data across administrative boundaries to make it seamless. In this way CMN members build on each other's investments and are able to customize applications to meet individual communities' needs for mapping and inventory information. *Building local capacity and expertise, sharing ideas and linking all community data across administrative boundaries are the key objectives of the CMN.*

Who is the CMN?

The Community Mapping Network is made up of a number of community groups, organizations and individuals that collect and map natural resource information. A steering committee responsible for managing the CMN includes representatives from the BC Conservation Foundation, Fisheries and Oceans Canada, Environment Canada (Canadian Wildlife Service), BC Ministry of Water, Land and Air Protection, BC Ministry of Agriculture, Food and Fisheries, Fraser Valley Regional District, Greater Vancouver Regional District, local governments, and community groups. *The CMN is a network of partners.*

What are the activities of the CMN?

Integrated natural resource information is necessary to assist communities and local governments with land use planning, to promote conservation and protection of sensitive habitats, and to raise awareness and respect for ecological values. *The CMN is about integrating information.* The CMN promotes standard methods of collecting

and mapping community information (though in practice methods vary). The CMN does not have a master database.

The Community Mapping Network:

- Builds capacity within communities to collect and manage resource information;

- Uses a network of servers to provide internet access to resource information, base maps and imagery;

- Develops common methods and standards for data collection;

- Links community-based mapping with larger agency databases such as the Canada/BC Fisheries Information Summary Systems (FISS) and the Coastal Resource Information System (CRIS);

- Shares ideas and project information locally and internationally;

- Provides information about watershed management, stream ecology, fish and wildlife habitat and restoration opportunities and promotes active stewardship;

- Creates an open forum for discussing the use and management of natural resources; and

- Promotes planning sustainable communities.

How Community Mapping Works

The Community Mapping Network integrates community and agency natural resource information using an interactive geographic information system (GIS) called Autodesk MapGuide. A series of servers is utilized to share the workload of serving province-wide base maps, high resolution orthophotography and selected resource information (Fig. 1). Maps and natural re-

source information are "web-served" in an easy-to-use format.

Many types of information are provided through the CMN, such as fish and wildlife distribution, streams and wetlands, eagles and herons, rare and endangered species, and possible restoration sites.

Agency and community members with suitable qualifications and password clearances can be granted direct access to CMN maps and databases over the internet. On-line digitizing tools (Fig. 2) can then be used to update and edit existing resource information and to delineate the location of community mapping projects in British Columbia, Canada and around the world.
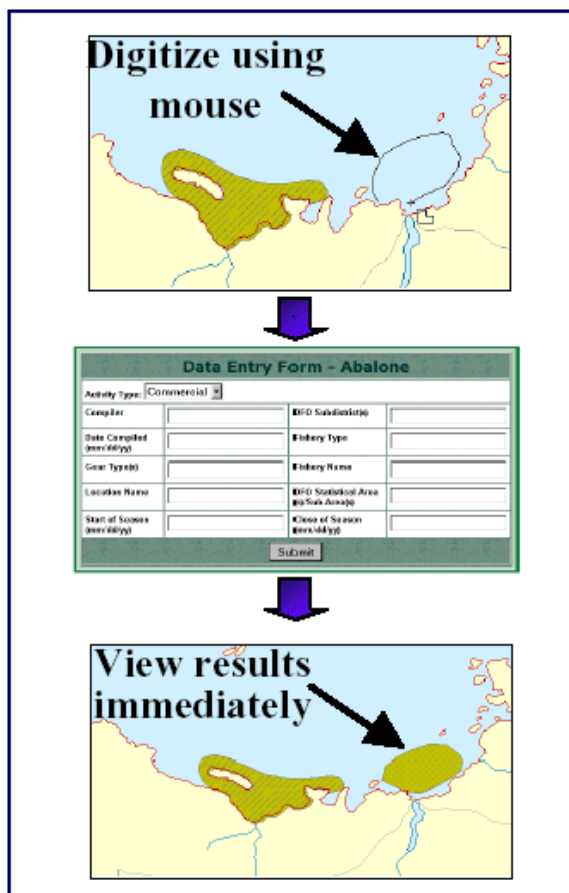

Figure 2. Digitizing features

The scope of the CMN

Selected information and thematic maps are available at a scale of 1:5,000 for the Georgia Basin and Central Okanagan. Province-wide coverage is also available at smaller scales for watercourses, fish distribution, coastal resources and other themes. Several mapping projects exist for specific resources or for specific areas, for example the B.C. Wetlands Atlas, the Upper Skeena Atlas, and the Vancouver Island Wildlife Tree Atlas.

Four types of mapping projects can be accessed through the CMN, including:

- **Community projects**: Inner Coastal Natural Resource Centre, Comox **Valley** Project Watershed and Upper Skeena Streamkeepers, and The Georgia Strait Alliance;

- **British Columbia projects**: Sensitive **Habitat** Inventory and Mapping, BC Wetlands, Wildlife Observations, Coastal Resources, Natural Resources Information Network, Vancouver Island Wildlife Trees, Sensitive Ecosystems Inventory, BC Watersheds, South Coast Cutthroat;

- **National projects**: Stewardship **Canada**, FrogWatch

- **International projects**: Community Mapping Projects Directory.

A good example of a developing application on a provincial scale is agricultural GIS. GIS layers of information are used in agriculture for planning, regional drainage and water use efficiency.

Concrete results

Methods provided through the CMN reflect a set of tools to explore and promote awareness of sensitive habitats by mapping their location and inventorying their attributes.

The awareness and commitment to local watercourses and other sensitive habitats is an important process created through co-operation of local communities, First Nations, municipalities, planners and managers. Community mapping methods comprise a set of tools and methods that can be used to help conserve fisheries, wildlife and aquatic habitat resources throughout British Columbia.

The time is right to share the results from successful community mapping projects completed over the last few years, and to demonstrate how the information is being used to make better resource management decisions. *The purpose of this document is to demonstrate by examples how better information results in better planning, leading to concrete results.*

Case study themes

Given the large number of mapping projects that have been undertaken recently in British Columbia, it is possible to present only a small subset of them at this workshop. Case study criteria for inclusion in the workshop included:

1. concrete results have been achieved or are pending;

2. ample information is available and the cases can readily be presented in this forum;

3. they are examples of good methods that ought to be promoted.

Additionally, case studies were selected to be reflective of the following themes:

- **Planning Tools**: e.g., greenways and protected area mapping, community and neighbourhood planning, development permitting, watershed planning

- **Resource Mapping and Restoration Opportunities**: e.g., mapping invasive plants, rare and endangered species, riparian and aquatic areas, wildlife habitat, fish distribution and watercourses

- **Engineering Tools**: e.g., determining impervious surface cover, managing storm water drainage, ditch maintenance (for settled and agricultural areas)

- **Tools for Regulatory Compliance**: e.g., streamside protection regulations, local government zoning and development permit areas, watercourse classification, Land Covenant registry

- **Information Systems Support**: e.g., Community Mapping Network, Sensitive Habitat Inventory and Mapping methods [refer to Appendix 1: section on Sensitive Habitat Inventory and Mapping (SHIM)].

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1. Brown, T.G., L. Barton, and G. Langford. 1996. The use of a Geographic Information System to evaluate Terrain Resource Information Management (TRIM) maps and to measure land use patterns for Black Creek, Vancouver Island. Canadian Manuscript Report of Fisheries and Aquatic Sciences 2395.

Building Community Capacity: the Role of Local Inventory and Mapping Endeavours

"Heroes are not grand statues framed against a red sky. They are people who say this is my community and it is my responsibility to make it better." Tom McCall (former Governor of Oregon), 1913-1983.

The Lower Mainland represents one of the continent's most biologically diverse areas. In addition to its inherent richness, the Fraser River estuary is also part of an important flyway for migratory birds. The Fraser River and its tributaries support large and valuable salmon runs. Protecting the natural spaces that have generated this wealth of life is an issue of importance for conservation agencies and sections in all levels of government (federal, provincial, regional, and municipal). However, governments (at any level) do not have sufficient funds to buy all the sensitive natural areas in the Lower Mainland that need protection. Similarly, the ability of governments to regulate potentially detrimental activities on public or private lands is limited by a lack of staff, political mandate, conflicting policies, a large and confusing array of regulations, and many other social and economic impediments.

The real success of efforts to protect the environment in the Lower Mainland and elsewhere will depend on the individuals who actually live on or manage the land — e.g., landowners, developers, farmers, fishers, foresters and community volunteers. These are the people who actually touch and change the land, whose actions directly impact both land and water. These are the people who make everyday decisions that maintain, transform or deplete the landscape. Long-term conservation of our natural environments will depend on a conservation ethic with a

vation ethic with a respect for the land and water. As the Lower Mainland continues to grow it is essential local public stewardship of all natural habitats improves.
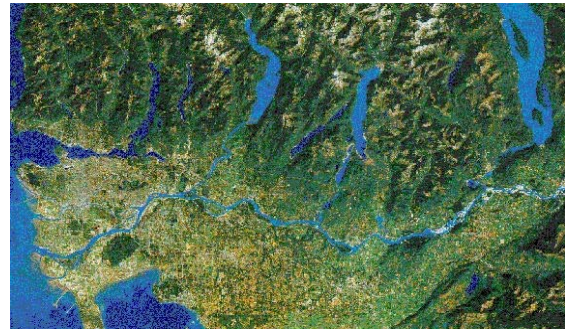
Traditionally, federal and provincial agencies have been responsible for environmental review of development projects through interagency referrals. This approach has been piecemeal, and a variety of staffing and financial constraints have often prevented comprehensive assessment and follow-up. But if sound environmental information is generated at the local level it reflects the commitment and ability of the community to shape and sustain their environment. When communities are involved in collecting and managing resource information they are better able to promote its use in local and regional planning initiatives.

There is a growing interest from communities and stewardship groups to take a more direct role in environmental planning and management. These communities are looking for encouragement, information, guidance and the tools to undertake the tasks. The growing number of Community Conservation Centres focusing on local natural resource knowledge are a step in this direction as are the Sensitive Habitat Inventory

and Mapping Procedures (SHIM), that assist suitably trained volunteers to inventory and accurately map existing natural areas within their communities.
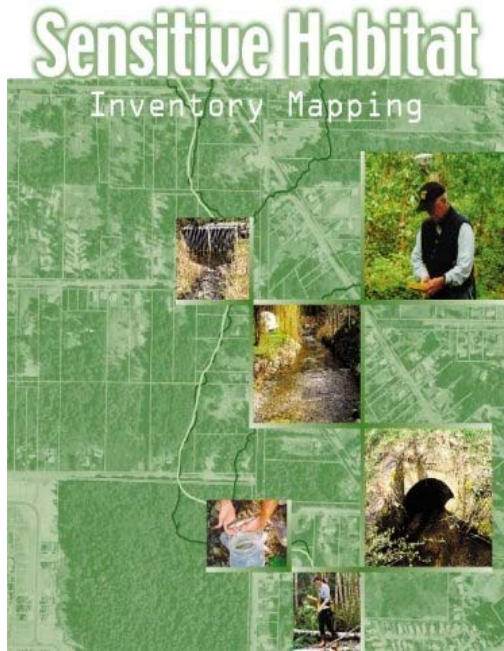
This growth in community capacity also provides opportunities for education, skill development, public awareness and an expanded local economy.The long term viability of sustainable communities depends on processes that fully integrate environmental, economic and social considerations into all aspects of decision making.

The benefits of having accurate environmental information available to the communities and local governments are significant. They include:

- Consolidation of local resource knowledge for support of community-based management (information becomes more accessible and increasingly familiar to use)
- Seamless integration of environmental information with other municipal datasets
- Updated maps and environmental inventory (errors or omissions are identified and corrected at source)

- Reduced staff and turnaround time for habitat referrals by all reviewing agencies
- Improved cooperation between communities, local governments and senior government agencies
- Opportunities for training of community members, First Nations, and students in data collection, data analysis and data management skills.

Local habitat inventory and mapping projects have been undertaken throughout B.C. and many more are currently underway. Local resource atlases, customized for use by local government planners and developers, have been used to support Local Resource Management Plans, Official Community Plans, and Watershed Management Plans in a number of B.C. regional districts. The atlases have helped to define Development Permit Areas and have improved identification of candidate areas for protection, enhancement or restoration. The atlases have assisted local regulators in administering the Forest Practices Code, the Water Act, the Land Development Guidelines and the Local Government Act, and will assist in future implementation of the Streamside Protection Regulations. Essentially, a knowledgeable community that knows where their sensitive resources, lands and wetlands are situated, can more effectively care for them.

Some examples of local inventory and mapping initiatives:

- *Sunshine Coast Habitat Atlas*

The Atlas is a locally created centralized data warehouse for the Sunshine Coast Regional District, consisting of over 40 GIS layers compiled from government and non-government sources.

Benefits:
➢ TRIM road and stream lines for the district have been and will be corrected
➢ Data has been converted into a single standard format and map projection
➢ All information existing for the Sunshine Coast Regional District has been integrated
➢ Accurate custom maps can be made for community groups and local businesses
➢ Has provided training and employment for a GIS specialist (full-time 3 year position) and seasonal employment for a small mapping crew in the field
➢ Has increased confidence in the information available for local planning purposes

- *Langley Environmental Partners Society*

The Township of Langley supported the creation of the Langley Environmental Partners Society (LEPS) to carry out stream mapping and other conservation activities. LEPS now conducts the field component on some Township projects, for example providing stream surveying for watercourse classification, and hosts educational and restoration activities.

Benefits:
➢ Has provided training for large numbers of university, college and high school students in use of high end GPS systems, GIS analysis and computer database programs
➢ Has provided local ecological data that have been used for research papers and presentations on stream dynamics and watershed ecology
➢ Information has been used to prioritize actions on habitat improvement and restoration in Langley
➢ Has increased community pride and sense of stewardship of the land

- *Ucluelet Inlet Shoreline Atlas*

This atlas was created to provide inventory information on the inlet for agencies, regional and municipal planners and local stakeholders. It employed a pilot methodol-

ogy for mapping coastal shorelines using GPS procedures developed by SHIM.

Benefits:

➤ Provided direct employment for a field crew of displaced fisheries workers from the Ucluelet and Nuu-chah-nulth communities

➤ Provided training for the crew in use of high-end GPS systems, data collection and GIS analysis and mapping

➤ Provided accurate mapping of local coastal resources to assist regional government in protection, restoration and enhancement of habitats and resources native to the Inlet

- ***Comox Valley Project Watershed Society***

Established to operate in the watersheds of the Comox Valley, the Project Watershed

Society is a non-profit group that produces environmental reports and accurate mapping to promote community stewardship initiatives and facilitate local planning.

Benefits:

➤ Products developed have been used by local environmental groups for public awareness-raising and enhancement project planning

➤ Information has been used by the Comox Regional District for development of their Official Community Plan, Development Permit Area designations, Liquid Waste Management Plans, Greenway Plans and Watershed Management Plans

➤ Has provided training in stream inventory and monitoring to over 200 local citizens

➤ Has provided regular seasonal employment to mapping field crews and associated training in use of GPS units

➤ Has provided full time employment for a GIS technician and project manager