Linking Community Based Ecosystem Monitoring to Local Decision Making and Policy Development on Sustainability

Voluntary Sector Initiative (VSI) Project

Final Report

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Executive Summary

This is the final report of the Government of Canada's Voluntary Sector Initiatives project: "*Linking Community Based Ecosystem Monitoring to Local Decision-making and Policy Development on Sustainability*," known as the **Community Based Monitoring initiative**. Two principal project partners have prepared this report: the Ecological Monitoring and Assessment Network-Coordinating Office (EMAN CO) and the Canadian Nature Federation (CNF).

Project goals

i.   Develop, test and enhance a conceptual framework for Community Based Monitoring in support of sustainability; and,

ii.   Establish a national network of Community Based Monitoring across Canada.

The two goals are closely linked. Developing and testing the conceptual framework involved the efforts of thirty-one Canadian communities and these communities now form the core of what has evolved into the **Canadian Community Monitoring Network** (CCMN).

VSI funding for the project was shared in partnership by the EMAN CO and the CNF. The CNF administered the project and the EMAN CO provided technical and management support, through two national coordinators, one working for the CNF and one for the EMAN CO. Twelve regional coordinators located across Canada worked at the community level supporting Community Based Monitoring (CBM) linked to decision-making in pursuit of sustainability. A Steering Committee made up of representatives from EMAN CO, CNF and project researchers provided advice and guidance to the CBM initiative.

Summary of Activities

i.   Development of a conceptual framework to guide the CBM initiative;

ii.   Hiring of 12 regional coordinators to work in 31communities across Canada to promote and facilitate Community Based Monitoring;

iii.   A workshop held at Econiche House, Cantley, Quebec from March 16-20, 2002 to train the regional coordinators on CBM;

iv.   Coordinators initiation of CBM from March 2002 to March 2003;

v.   Mid-term evaluation of regional coordinators' experiences across Canada;

vi.   A mid-term workshop held in Canmore, Alberta from October 3-8, 2002 to share experiences, re-assess priorities and discuss post project funding;

vii.   Community Based Monitoring activities; and

viii. Final evaluation of the conceptual framework and synthesis of lessons learned;

ix.   Creation of an enhanced conceptual framework for CBM; and,

x.   Publication of a synthesis document: *Improving Local Decision Making through Community Based Monitoring: toward a Canadian Community Monitoring Network*.

Conceptual Framework for Community Based Monitoring

Research throughout the CBM initiative was designed to develop and test a conceptual framework for CBM in Canada. The research team achieved this objective through four key phases:

1. Development of a conceptual framework to guide the CBM initiative;
2. Application of the conceptual framework in 31 Canadian communities;
3. Evaluation of the conceptual framework through 26 interviews with coordinators; and,
4. Enhancement of the conceptual framework for Community Based Monitoring.

Development of a conceptual framework to guide the CBM initiative

Initial research was designed to provide guidance to the project in terms of establishing a conceptual framework to guide the CBM initiative (Whitelaw, 2002). The framework was based on an extensive literature review and interviews with numerous community-based organizations working on environmental and sustainability initiatives across Canada. The original framework (below) consisted of seven components in each of two phases: Establishment and Operationalization of Community Based Monitoring.

Phase I: Establishing CBM	Phase II: Operationalizing CBM
• Reconnaissance	• Capacity Building
• Consultation & Outreach	• Visioning
• Champion Identification	• Communication Strategy
• Governance Analysis	• Ecological Monitoring
• Partnership Development	• Achieving Influence
• Membership Skills Assessment	• Fundraising
• Organizational Structure	• Project Management

Conceptual framework to guide the CBM initiative.

Application of the conceptual framework

In essence, thirty-one Community Based Monitoring experiments were established in 2002-2003 for the purpose of testing the two-phase conceptual framework. Twelve regional coordinators were hired to:

i. Define the best approaches and practices of engaging entire communities in monitoring activities;
ii. Apply the conceptual framework (above) in their communities;
iii. Build local capacity to collect, deliver and use ecological information to facilitate decision making in support of sustainability; and,
iv. Use Community Based Monitoring information to better inform local policy.

Some of these communities now constitute the core of what has evolved into the Canadian Community Monitoring Network (CCMN).

Rae-Edzo
Deline
Inuvik

Sydney
Northside
Glace Bay
New-Waterford

Port Alberni
Parksville-
Qualicum Beach
Nanaimo

Fredericton
Canaan-Washadamoek
Moncton
Bouctouche
St. Andrews
Saint John

Pincher Creek
The Peigan First Nation

Turner Valley
Black Diamond
Okotoks
Canmore
Banff
Exshaw
Harvey Heights

Pointe-Fortune
Otterburn Park

Peterborough
Lakefield
Norwood
Hamilton
Flamborough
Glanbrook

Evaluation of the conceptual framework

Evaluation of the conceptual framework, as applied in thirty Canadian communities, was conducted through a series of interviews with regional coordinators (Pollock, 2002). The evaluation was designed to record their experiences of engaging communities in Community Based Monitoring, through interviews at two different points during the pilot year. Primary interviews were held mid-way through, and secondary interviews repeated the methodology at the end of the year. Two rounds of interviews were important for a comprehensive test of the original conceptual framework, in terms of identifying the following:

- The strengths and weaknesses of the conceptual framework;
- To what extent the conceptual framework was relevant "on the ground;"
- Which approaches proved to be most effective for certain activities;
- Similarities and differences between communities;
- Factors for success, from the perspective of the regional coordinators.

The enhanced conceptual framework for Community Based Monitoring

The evaluation of the original conceptual framework, led to the creation of an enhanced conceptual framework for Community Based Monitoring (Pollock, 2003). Research from the CBM initiative first established three important principles for how to approach CBM:

i.   The approach must meet the challenge of community and ecological diversity with versatility: approaches that are appropriate to context, respectful of local cultures, and represent an attempt to establish 'best practices.'

ii. The approach must be iterative in nature: dynamic interaction between phases, goals and outcomes; synergistic activities build capacity at all stages of CBM.

iii. The approach must be adaptive to change, flexible and opportunistic. It should continually incorporate new information, assessing capacity needs and fulfilling them to build social capital.

Then, the enhanced framework reflects these three principles and expands upon the original conceptual framework developed for the CBM initiative. The enhanced framework is simplified into four powerful themes and accompanied by a Tool Box for CBM. The original two-phase framework is dissolved, yet all its components are contained in the enhanced version.
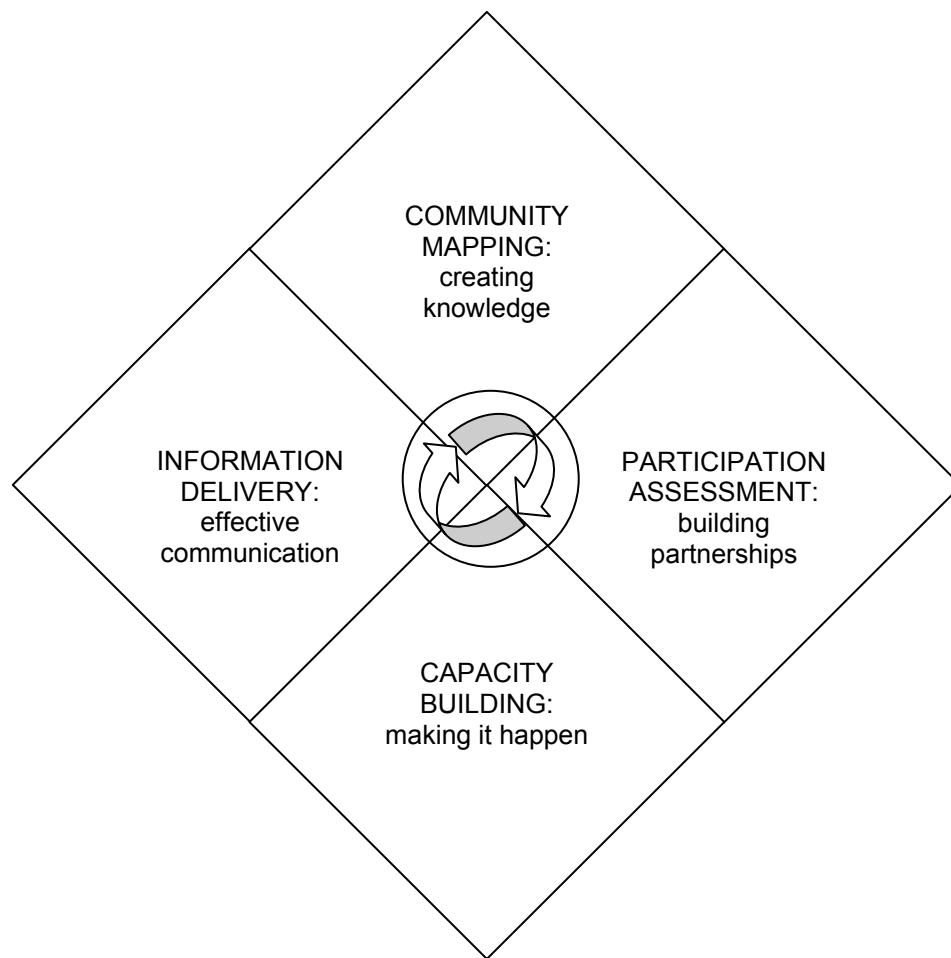
Four key phases for Community Based Monitoring

Community Mapping: Gathering information about the community helps to create knowledge for designing CBM in a way that is unique to the community and its values, vision and interests. It provides the opportunity for decision makers to describe their information needs and the chance to maximize collaboration between partners.

Participation Assessment: Understanding the groups and people involved in CBM generates knowledge about how to engage them, use their skills and meet their needs. Participation Assessment helps find the best approaches for building partnerships and capacity.

Capacity Building: Enhancing the community's ability to carry out monitoring requires capacity in the form of resources and skills – both social and technical. Good coordination, training and information delivery mechanisms are essential to sustain community engagement.

Information Delivery: Communication flows through all aspects of CBM. Educating people about monitoring, identifying local priorities and reporting back the results rely on effective communication. When information needs are identified, monitoring becomes demand-driven, which informs the development of more effective tools and solutions for local environmental issues. The decision makers then need to feed this knowledge into appropriate local choices that are adaptive.

Factors for Success

The following critical factors have been identified for successful implementation of community based monitoring relevant to all parties involved, including: community residents, decision-makers, local or regional coordinators, CBM champions and institutions, non-governmental organizations, industry partners, and government agencies. The factors for success are:

i. Approaches to engaging the community are context specific
ii. Information delivery mechanisms are established
iii. The CBM experience is meaningful for participants
iv. Strong coordination capacity exists
v. Partnerships are built in pursuit of sustainability
vi. Collaborative approaches are implemented
vii. Ongoing national support for a coordinated network is provided.

Lessons Learned

Several lessons emerged during the CBM initiative including potential benefits, future challenges, and other areas for discussion regarding collaboration, governance, and social capital.

Potential benefits

i. CBM brings people together from different groups, sectors, and jurisdictions, to form partnerships. Through these partnerships, the community can identify common concerns and possible solutions through the collection, evaluation, and sharing of information.
ii. CBM networks often seek out meaningful collaboration between citizens and government, thereby improving public involvement in community decision-making.
iii. CBM can enhance local governance structures, by putting the creativity, skills, and resources of many different individuals and groups toward solving a problem.
iv. CBM allows communities to increase knowledge about their environment by generating locally relevant monitoring information. CBM brings to monitoring a unique understanding of the local situation and the needs of individual communities. Communities can then use this information to set their own limits on development and measure whether they are met.
v. The use of standardized monitoring methods across Canada will allow for the comparison and integration of information within landscapes and among communities.
vi. CBM gives local decision-makers the information and tools they need to make informed policy choices and management plans which are adaptive and responsive.
vii. CBM contributes toward building social capital in participating communities. Increased social capital improves the community capacity to deal with the many complex issues and choices associated with sustainability.

While the coordinators were able to make considerable strides toward implementing CBM, some aspects of the process continue to prove challenging in several communities.

Future Challenges

i. Achieving the long-term commitment of stakeholders to CBM.
ii. Identification of decision-makers' information needs and making the connection to local decision-making structures in order to achieve influence.
iii. Integration of all information gathered for a comprehensive assessment of local ecological sustainability.
iv. Finding improved systems for managing data.
v. Gaining the long-term commitment of government for scientific support, coordination, advice and assistance.
vi. The absence of standardized monitoring methods to respond to all local priorities such as soil toxicity, invasive species and the use of pesticides.
vii. The identification of ecological thresholds or breaking points.

Several regional coordinators will continue to work toward identifying solutions to these challenges with their community and the support of the Canadian Community Monitoring Network through the iterative process of CBM.

Key Outcomes

The key outcomes for the CBM initiative include:

- An enhanced conceptual framework for Community Based Monitoring;
- The establishment of a national network of communities monitoring ecological sustainability;
- An enhanced ability to gather information on ecosystem status and trends;
- An enhanced ability to deliver timely information for responsive management;
- Emergence of the importance of indicators that provide early identification of environmental change; and,
- Increased development of an engaged, informed public.

The results of this initiative and the creation of the Canadian Community Monitoring Network, will contribute to developing CBM capacity in Canada, community empowerment, meaningful public involvement, adoption of adaptive management at the local level and progress toward sustainability.

Recommendations

The CBM initiative has been the most inclusive and complete look at local level community based monitoring in Canada to date. With input from over 12,000 participants (volunteers, scientists, local decision makers, government partners, academics, industry representatives), the emergent Canadian Community Monitoring Network has developed a standardized

approach and tool set to engaging communities in CBM. The enhanced conceptual framework for CBM outlines the most comprehensive and cost-effective directions for communities to monitor, track and respond to local environmental issues, while building the capacity to participate in a national environmental reporting system.

The Emergent Canadian Community Monitoring Network

The CCMN and CBM together provide a unique and much-needed mechanism to fully deliver on the objectives and agendas of a number of organizations including Environment Canada, other federal resource departments, Provincial/ Territorial agencies, municipalities, the NRTEE Conservation of Natural Heritage Task Force, the Federation of Canadian Municipalities, Conservation Authorities, Regional and County planning, Biosphere Reserves, etc. All share an interest in stewardship, sustainable management, public engagement and enhancing the effectiveness of science.

To ensure the continuation and growth of the Canadian Community Monitoring Network, support activities must continue at a national scale in the following areas:

- Capacity building for monitoring: ongoing protocol development, training, equipment lending, information management, data evaluation and reporting.
- Capacity building on means to develop and nurture networks and partnerships, leadership skills, advocacy, negotiation and communication.
- Research into possible applications of the enhanced framework for CBM in Canada at broader scales such as watershed or wildlife corridors, where multiple communities are involved.
- Marketing of the CCMN through promotional material outlining the services of the Network.
- Centralized network coordination.

Federal Government Support

Collaboration and partnership will continue to be the basis of the CCMN.

- The Federal Government should act in the common interest to ensure the availability and effectiveness of the CCMN by providing an ongoing foundation through the EMAN Coordinating Office consisting of national coordination, scientific support and funds to initiate, facilitate and contribute towards collaborative community initiatives.
- Participating communities should create a vision and mission statement for the CCMN.
- Environment Canada and the Canadian Nature Foundation should participate as board members of the new organization.
- Champions of Community Based Monitoring should be linked through the network.
- Further research should be carried out in support of the CBM initiative, to track success over longer periods of time, identify key variables for success within specific

community contexts, monitor how challenges to CBM are resolved, and whether the full range of potential benefits is realized.

- Application and development of these CBM initiative results should be pursued through partnerships with additional communities, parks, protected areas and landscapes, nationally and internationally.

Capacity Building

- Capacity should be built through a training manual for Community Based Monitoring groups; development of the manual should be guided by the enhanced framework for CBM, and marketed to all CBM groups and related organizations across the country.

Information Delivery & Influence

- The effectiveness of ecological monitoring should be enhanced at the community level through community visioning, selection of goals, indicators and monitoring protocols.
- Environmental information for decision-making should be targeted, accessible, integrated, useable and timely.
- Community Based Monitoring groups should seek to influence local government; while government should seek guidance from CBM groups.

Public Participation, Collaboration and Social Capital

- Community Based Monitoring groups should establish open forums for public participation and results from collaboration should be shared with local councils and community leaders.
- Community Based Monitoring initiatives should actively market related stewardship activities such as river clean-ups or restoration projects, as these engage the community in moving closer to sustainability.
- Social capital should be seen as one of the most valuable products of Community Based Monitoring.

1.0 Introduction

Box 1: Community Based Monitoring (CBM) is defined as a process where concerned citizens, government agencies, industry, academia, community groups and local institutions collaborate to monitor, track and respond to issues of common community concern.

Community based monitoring (CBM) activities in Canada are increasing with a number of government agencies and non-government organizations (NGOs) embracing the concept (Box 1). Unfortunately, comprehensive descriptions of CBM activities in Canada are not yet available. The following examples highlight the diversity of CBM activities in the country:

- Four notable initiatives are the **NatureWatch**[1] programs (PlantWatch, WormWatch, FrogWatch, IceWatch); **Wildlife Watchers**[2] programs**; the Biosphere's EcoWatch**[3] program; and **SkyWatchers.**[4]

- **Bird Studies Canada** and the **Canadian Nature Federation** lead extensive bird monitoring throughout the country (Bird Studies Canada, 2002; Canadian Nature Federation, 2002).

- **Citizens' Environment Watch** works with "hundreds of community groups and school youth to assess the health of local waters" (Sharpe *et al*., 2000:30).

- The **Watershed Report Card** has developed a watershed management tool for use by communities to inventory, assess and monitor aquatic conditions in their watersheds (Watershed Report Card, 2003).

- Canada's **Biosphere Reserve** communities and associated NGOs monitor a variety of issues including forest biodiversity and land use change (Ecological Monitoring and Assessment Network Coordinating Office, 2002; Canada MAB, 2000).

- Hundreds of smaller groups, organizations, schools and individuals also undertake environmental monitoring that is less standardized and coordinated.

Despite these activities listed, and the general agreement that CBM has the potential to promote sustainability and adaptive management, there is neither a discernable network in place to support CBM in Canada, nor a toolbox of common approaches. The need for network coordination emerged during discussions over the course of three community based ecosystem monitoring workshops held during the 1999, 2000 and 2001 annual Ecological Monitoring and Assessment Network (EMAN) National Science Meetings. Participants at

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[1] More detail on the NatureWatch programs is available at www.naturewatch.ca
[2] Learn more about Wildlife Watchers at www.on.ec.gc.ca/wildlife/newsletters/choose-e.html
[3] Biosphere's EcoWatch information at http://biosphere.ec.gc.ca and follow the ObservAction Network
[4] SkyWatchers, administered by the Meteorological Service of Canada, http://skywatchers.on.ec.gc.ca/

these workshops indicated that CBM activities in Canada would benefit from coordination and network support.

In response, the EMAN Coordinating Office applied for Voluntary Sector Initiatives (VSI) funding in partnership with the Canadian Nature Federation (CNF) to carry out development work on Community Based Monitoring in Canada (Ecological Monitoring and Assessment Network Coordinating Office, 2001). Funding was approved and the VSI project "*Linking Community Based Ecosystem Monitoring to Local Decision Making and Policy Development on Sustainability*" was launched in the winter of 2002. Subsequently, the project will be referred to as the **Community Based Monitoring (CBM) Initiative**.

The Voluntary Sector Initiatives proposal (Ecological Monitoring and Assessment Network-Coordinating Office, 2001) specified the following outcomes:

i.   Nationally consistent approaches to community monitoring of ecosystem changes including methods, databases and interpretation;
ii.   A greatly enhanced ability to detect and report on ecosystem status and trends on an ecozone or national basis;
iii.   A greatly enhanced ability to provide timely information allowing responsive policy and priority setting;
iv.   Synthesis and national application of successes and lessons in community involvement and capacity building;
v.   Increasing numbers of communities successfully empowered and engaged in ecosystem monitoring, inclusive decision-making related to sustainability and informed policy development at a variety of scales;
vi.   A national voluntary sector network engaged with communities in local sustainability, inclusive decision-making and collaborative policy development;
vii.   Major contributions toward an informed public, sustainable communities, and support to ecological choices and trade-offs.

Each of these major outcomes will be re-visited in a concluding section of this report (section 7.0) providing insight into the overall outcome of the CBM initiative.

1.1 Project Goals

The CBM initiative had two main challenges with the overall purpose of achieving the project outcomes identified above. The primary goals were to:

i.   Develop, test and enhance a conceptual framework to guide Community Based Monitoring in support of sustainability; and,
ii.   Establish a national network of Community Based Monitoring across Canada.

In essence, thirty-one CBM experiments were established for the purpose of these closely linked goals. Developing and testing the conceptual framework involved efforts in thirty-one

Canadian communities (Fig. 1). Many of these communities now constitute the core of what has evolved into the Canadian Community Monitoring Network (Box 2).

Box 2: Within the Canadian Community Monitoring Network (CCMN), community based monitoring (CBM) provides the means to work together to gather and deliver information and adapt to change, not as isolated communities, but as a network that learns from each other and shares resources. A coordinated network of CBM provides a 'community of practice' that shares standardized protocols, training support, and data management systems. It can also provide decision-makers with early warnings of environmental issues before they become catastrophes. For more information visit www.ccmn.ca

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1.2 Communities and Coordinators

Community	Province/Terr.	Regional Coordinator
1. Deline 2. Inuvik 3. Rae Edzo/Fort Smith	Northwest Territories	Mike Salomons, Andrew Applejohn, Ruthann Gal, Aurora Research Institute
4. Nanaimo 5. Parksville-Qualicum Beach 6. Port Alberni	British Columbia	Tanya Laing
7. Canmore 8. Banff 9. Exshaw/Harvie Heights	Alberta	Melanie Watt, Biosphere Institute of the Bow Valley
10. Black Diamond 11. Turner Valley 12. Okotoks	Alberta	Maureen Lynch
13. Pincher Creek 14. Peigan Native Reserve	Alberta	Joleen Timko
15. Hamilton 16. Glanbrook 17. Flamborough	Ontario	Brian McHattie, Environment Hamilton
18. Peterborough 19. Lakefield 20. Norwood/Millwood	Ontario	Meredith Carter, Otonobee Conservation
21. Otterburn Park	Quebec	Quentin van Ginhoven
22. Pointe Fortune	Quebec	Stéphane Tanguay
23. Saint John 24. St. Andrews 25. Bouchtouche	New Brunswick	Marieka Arnold, NB Federation of Naturalists
26. Moncton	New Brunswick	Marise Robichaud, University of Moncton
27. Fredericton 28. Canaan-Washademoak	New Brunswick	Shawn Dalton, University of New Brunswick
29. Glace Bay - New Waterford 30. Northside 31. Sydney	Nova Scotia	Rob Boone, Mark Johnson, Judy McMullen, ACAP Cape Breton

1.3 Assumptions

The project partners identified a number of assumptions prior to launching the CBM initiative. These assumptions flowed from their experience with community involvement in environmental matters, ecological monitoring and environmental management. The assumptions are identified below:

- Sustainability at the local level is desirable and worthwhile to promote as a community goal;
- CBM has the potential to contribute to the achievement of sustainability;
- CBM can play an integral role in the Adaptive Environmental Management process;

- Most of the tools exist to establish a network of CBM groups with the capacity to contribute to and influence local and regional policy development and decision making;
- These tools can be crafted into a conceptual framework to guide the establishment and maintenance of CBM groups;
- The conceptual framework may be tested through the CBM initiative and enhanced based on detailed program evaluation.

1.4 Role of this Report

This report has three distinct roles.

1. Present results of the CBM initiative in terms of the enhanced framework, the lessons learned and other outcomes that can inform a series of recommendations.

2. Clearly articulate the management process followed throughout the CBM initiative, at both national and regional levels, and to provide feedback on the process. The objective here is to provide full transparency so that anyone interested might apply similar or modified management processes to future community based initiatives.

3. Clearly explain the research undertaken in support of the CBM initiative including both the research to develop the framework to establish and implement CBM and the research undertaken to evaluate the implementation of the framework in the thirty-one communities. Extensive literature reviews were carried out in support of all research. The literature reviews are included in Appendix 1A.

Toward these ends, this final report has been structured as follows:

- Section 2 details the management process used to oversee the entire CBM initiative;
- Section 3 sets out the conceptual framework for guiding the CBM initiative and the methods used for its development;
- Section 4 discusses the evaluation methods, results and key observations.
- Section 5 introduces the enhanced conceptual framework for CBM;
- Section 6 presents a number lessons learned from the CBM initiative;
- Section 7 concludes the report with a discussion of the VSI project outcomes; and,
- Finally, Section 8 provides a series of recommendations to enhance CBM in Canada.

2.0 Project Management and Implementation

The purpose of this section of the report is to present and discuss the main management and implementation components of the project. The section attempts to provide transparency so that anyone interested in the project would be able to recreate the management and implementation structure used to deliver the CBM initiative.

The CBM initiative, over eighteen months, constituted of two phases: Phase 1, to design project elements for Phase 2, implementation.

Phase 1: Project Design and Planning

This project design phase included:
- Background research related to engaging Canadian communities,
- Detailed design of project delivery needs,
- Design of reporting mechanisms to track community progress,
- Planning of events such as training and national meetings,
- Preparing contractual, budgetary, and administrative processes.

Phase 2: Project Implementation

In December 2001, a call for proposals went out to organizations, consultants, and individuals across Canada. Over 120 proposals were received; most of which would have made excellent additions to the project. Through a seven-person selection committee, and with criteria related to the project goals, 12 regional coordinators were selected to engage thirty-one diverse communities across Canada in CBM activities.

2.1 Selection of Regional Coordinators and Pilot Communities

During the selection process is was collectively decided that the research project would benefit most by intentionally selecting a diversity of communities and coordinators based on the following criteria:

Coordinator	Community
education level and type	population/density
experience with monitoring	environmental apathy
connectivity to the community	economic/resource base
non/institutional proponent	prominent environmental issues

By choosing a diversity of communities and coordinator backgrounds, this pilot project aimed at simulating and testing multiple scenarios. The intention of this diversification was to gain a better understanding as to what type of coordination skills could most successfully deliver on various project elements, and what type of community circumstances were best for implementing a comprehensive CBM program.

As a national pilot project focused on ecological indicators, our selection process was less concerned with ensuring even provincial distribution, but rather looked at ecozone distribution as the key factor (see Fig.1, above).

In instances where regional coordinators engaged more than one community, additional communities were required to be within the same region. This criteria was put in place primarily to ensure that transportation costs from one community to another were viable; however, this decision created a valuable opportunity to experience how neighbouring communities could be brought together on mutual environmental issues through Community Based Monitoring activities.

2.2 Management Structure

The management structure for the CBM initiative was composed of joint EMAN CO-CNF management, joint EMAN CO-CNF national coordinators, 12 regional coordinators working with communities, and a project steering committee composed of project partners and researchers, as illustrated below.

CNF Management: final approvals, general project guidance, project reporting.	**EMAN CO Management:** final approvals, signing authority, overall project guidance.
CNF National Coordinator: design and delivery of project phases in coordination with EMAN CO and project steering committee, administration of budget and contracts.	**EMAN CO National Coordinator:** design and delivery of project elements in coordination with CNF and project steering committee, scientific support to regional coordinators.
Regional Coordinators: design and delivery of project within pilot communities, quarterly financial and progress reporting to CNF national coordinator.	**Project Steering Committee:** (comprised project researchers, CNF, and EMAN CO) collaborative and adaptive approach to key project directions.

2.3 Training Workshop

Once the regional coordinators were contracted, the first priority was to bring everyone together to discuss the project implementation phases in the context of each pilot community. To achieve this objective, a training workshop was held at Econiche House, Cantley, Quebec from March 16-20, 2002. The training workshop included:

- Presentation of the conceptual framework to guide the CBM initiative
- Ecological monitoring protocol training sessions
- Presentations by each regional coordinator about their communities
- Individual work planning for the year by regional coordinators
- Group planning and visioning
- Reporting and communication procedures.

2.4 Reporting and Communications

Reporting
Reporting procedures were partly designed based on the feedback of the regional coordinators themselves, and designed to minimize the administrative processing time while ensuring that the lessons from each community were effectively captured to later be synthesized into this, and related, reports.

Quarterly Reports consisted of completing a monthly expense sheet, and completing a preformatted progress report (Appendix 2A), which was categorized by the components of the conceptual framework (section 3.0). The format of the progress report was deemed to be somewhat redundant by regional coordinators; however, the standardization of all reports allowed for effective tracking and comparison of issues between all communities. These reports were to be completed on a quarterly basis to concentrate, and thus minimize, the administrative requirements of the national coordinators, and to ensure that the regional coordinators had adequate time between reports to progress with projects developments.

Miscellaneous Reports throughout the pilot year, there were several other reporting requirements as defined by emerging project needs which included:

- Short story examples of monitoring applications
- Narrative descriptions of pilot communities
- Calculations of in-kind project donations
- Compilations of media attention received
- Reports on various levels of community participation.

It was found that these "as needed" reports were more difficult to compile in a timely manner. While this was in many cases an issue of workload and timing, in other cases it was clearly the result of a lack of consistently communicating and defining the deliverables needed.

Communications

Beyond the basic reporting elements of the project, several modes of communication were put in place to deliver updates on project developments, discuss adaptive needs of the network, and to connect regional coordinators to foster a sense of shared learning. The following modes of communication achieved various levels of success, although the most successful communication arose from two-way dialogue: not an expectation of communication from the top-down, but on a mutual and as-needed basis.

CCMN Intranet Site: This internet-based site was intended to be a place where the regional coordinators and the national management team could post and share files; form and participate in discussion boards; and, regularly login to check for group tasks. In the first few months the Intranet site was seen as a useful tool, however, it required participation from all members to be most effective. Although the technology was useful for storing and sharing information, it was often too slow, not user-friendly, and inconvenient for remote or dial-up Internet users. The result was minimal use by a very small group. The overall reason for inactivity was that most of the coordinators were far too busy designing and implementing the CBM initiative, and ultimately, it was easier and more efficient to use an email distribution list.

Conference Calls: As a result of a request from many regional coordinators for more interactive and frequent communications, a conference line was put in place to provide an opportunity for regular discussions. National coordinators found that this mode of communication was effective in that people could get a large amount of information covered in a short time, but the downfall was, that without someone actively recording minutes, many of the action items generated in the discussion became forgotten after the call was over. Also, with over 20 people involved in this project, it was difficult to plan calls where the majority of the group could participate. The calls did, however, foster a sense of network and participation and worked well when logistics allowed for them.

Group E-mails: This mode of communication was the most accountable, traceable, and efficient. A distribution list allowed for mass delivery of files, updates on the project, two-way request for information, and was unaffected by time zones. E-mail did lack a personal element that would have fostered a greater sense of trust and commitment.

Overall, communication was less than adequate from many perspectives. This should be considered a lesson in the formation and building of a new network. This project was extremely ambitious in terms of research goals, which often caused an overload of administrative work, resulting in lower levels of regular and personalized communication than may have been desired.

2.5 Canmore Workshop

In order to share experiences, re-assess priorities and discuss post-pilot project visions, a mid-term workshop was held in Canmore, Alberta from October 3-8, 2002. This workshop was an essential assessment of the overall progress of the project. The primary function of the workshop was to achieve a renewed a sense of network and shared learning amongst the regional coordinators.

Each regional coordinator had the opportunity to present their progress-to-date, while seeking advice and clarity in terms of ongoing implementation needs or future directions. These presentations made clear that there were several issues that needed to be addressed on a network level, such as:

- Roles and structures for fundraising
- Continuity of CBM implementation made in each community
- Future national coordination needs
- Models for what a next phase of the CCMN might look like.

Addressing these issues comprehensively will require an in-depth evaluation of the final reports from all regions, as well as the completion of a long-range strategic plan that considers the future coordination of a national network of CBM.

2.6 Performance Evaluation Process

Based on the original VSI proposal, the performance evaluation was conducted with regional coordinators following the general information on performance measurement (General Accounting Standards Board, Performance Measurement for Government Web Site http://accounting.rutgers.edu/raw/seagov/pmg/index.html.)

Performance measurement reporting is part of the concept of managing for results. Performance information assists with setting goals, planning programs, allocating resources, monitoring and evaluating results against goals, and improving programs to enhance performance.

Regional coordinators were asked to complete the following elements of a project performance evaluation:

Measures of effort in both establishment and operationalization phases including financial measures of expenditures/expenses, non-financial information including numbers of meetings held, participants attended, staff required to deliver on projects or programs, and other measures such as equipment or other capital assets used in providing services, programs, and/or projects.

Measures of outputs are accomplishments in terms of quantity measures based on the original conceptual framework for guiding the CBM initiative.

Measures of outcomes are accomplishments that occur from services provided, (i.e., a measurement of how successful various activities were).

Narrative information for context and explanations for the results of performance measures were welcomed.

2.7 Performance Evaluation Results

Measurement of Effort

The following table shows measurement of financial and non-financial efforts.

Efforts	Community Average	CCMN Totals
A. Financial Support		
Funding provided to communities	2,095	62,859
Value of In-Kind Support	3,105	93,125
Value of Volunteer hours	1,696	50,880
Value of Coordination Support	10,000	300,000
Totals……………………………..	$16,896	$506,864
B. Non-Financial Activities		
Number of Meetings Held	9	277
Number of Participants	80	2,435

Financial Support: Results from the measurement of efforts show the average financial support provided for implementing Community Based Monitoring programs at an estimated $17,000. This figure includes:
- Funding provided to communities from coordinators' expense budgets (VSI funds for materials, equipment, communications, meetings, etc.);
- Outside funding provided from grants and donations;
- In-kind support (e.g., equipment, office space, travel costs, expertise);
- Volunteer hours (calculated at $12.00/hour) given to monitoring-related activities;
- Coordination support, provided by the VSI grant.

It is interesting to note that the value of in-kind support for CBM exceeds the financial support provided to each community, on average. Although coordinators had access to an expense budget of approximately $3,000 per community for the year, many coordinators did not utilize the full amount. There may be several reasons for this: allowable expenses were not made sufficiently clear and therefore were unspent; project development in the first year did not meet or exceed allowable expenses; or, outside contributions combined with in-kind support largely met CBM needs, perhaps making VSI funds non-essential in some cases.

Potentially, costs of operationalizing CBM in subsequent years could be much higher than $17,000 given the costs of monitoring equipment, data management systems, and on-going

coordination and communication. Also, given the poor reporting of efforts and their value, it is possible that these estimations are significantly lower than actual figures.

Overall, however, coordinators stressed the need for funding continuity not quantity – that multi-year funding of smaller amounts was preferable to single year funding of larger amounts. This suggests that core funding to support coordination activities is the minimum requirement to sustain community based monitoring programs.

Non-financial activities: of which there are only two measured here, include a total of almost ten meetings per community in the pilot year. This figure includes meetings that were both attended by coordinators and initiated by them; and meetings ranged from one-on-one encounters and council presentations to community forums of several dozen participants. In addition to the 4,240 volunteer hours (value: $50,880), nearly 2,500 Canadians were directly engaged in establishing community based monitoring and an estimated 12,000 were aware of the initiative. The estimated value of time by those directly engaged, at one hour each is 2,500 hours with a value of $30,000 to $90,000 given the range of professionals and specialists engaged in meetings. If the maximum estimated value of non-financial activities is included, then the total financial support for the 31 pilot communities approaches $600,000, or $20,000 per community.

Measurement of Outputs

The following table lists the percentage of regional coordinators who completed each component of the original conceptual framework.

Establishing CBM	Coordinators Completed (%)	Operationalizing CBM	Coordinators Initiated (%)
Reconnaissance	100	Capacity Building	85
Governance Analysis	71	Visioning	71
Consultation & Outreach	85	Communication Strategy	71
Champion Identification	71	Ecological Monitoring	64
Partnership Development	85	Achieving Influence	64
Organizational Structure	21	Fundraising	71
Membership Skills Assessment	35	Project Management	78

Notes regarding Methods*:* It is important to note several features of the methods used to achieve these results. First, respondents had only two choices for their performance evaluation (e.g., either complete or incomplete) which excluded other categories of performance including whether a component was in progress or not applicable to their community.

Second, a measurement of completion was somewhat misleading given the iterative and cyclical nature of the framework. In other words, since many of the components are long-term processes or need to be continually adapted (e.g. partnerships and organizational structure), the level of 'completion' was not necessarily the most appropriate choice for measurement.

Third, for operationalizing CBM, respondents were given a different category than that used for the measurement of establishing CBM, making the measurement process somewhat confusing and possibly skewing results. While one phase is measured by completion, the other phase is measured by initiation. Therefore, results will inherently be higher for the components in the operationalization phase and lower for the establishment phase.

Notes regarding Results: The measurement of outputs for the Establishment Phase shows a surprisingly high level of completion. While this is understandable for the Reconnaissance phase, it is more surprising for Consultation and Outreach and Partnership Development– both long-term activities that exceed a period of one year. It is likely that the results reflect the percentage of those components "initiated" rather than "completed;" therefore, interpretation of results should be adjusted accordingly.

However, beyond the skewed results, this evaluation provides a rough sketch of which components were most frequently applied and provides a sense of which components were the focus of the initial year and which may be applied in subsequent years. Overall, coordinators were engaged most frequently in reconnaissance, consultation and partnership development activities, as well as significant capacity building efforts. Membership skills assessment was not well understood as a component of the framework and was most often conducted informally. Also, the timing of the pilot year (ending before monitoring season begins) is reflected in the components that were the least prominent activities: organizational structure, ecological monitoring and achieving influence.

Measurement of Outcomes

The measurement of outcomes (relative success of each component) was not possible for several reasons. Since 'success' was not defined in the survey, it was difficult for respondents to understand the question. The average response rate to the question was only 50 *per cent*, making results inconclusive. And respondents used two different interpretations of 'success.' One interpretation correlated the completion of a component to its success (i.e., a component was completed therefore successful, or incomplete and therefore unsuccessful). The other interpretation was highly subjective, reflecting how coordinators felt about their personal accomplishments within a one-year pilot and the prospect of future success.

For those that did respond, they tended to rank the success of each component relative to its completion. Reconnaissance was viewed as very successful based on a high completion rate. Likewise, organizational structure was seen as relatively unsuccessful, despite the high number of partnerships established and existing groups engaged in CBM.

2.8 Summary of Activities

In summary, the major activities of the CBM initiative included:

i.   Development of a conceptual framework to guide the CBM initiative;

ii.   Hiring of 12 regional coordinators to work in 31communities across Canada to promote and facilitate community based monitoring;
iii.   A workshop held at Econiche House, Cantley, Quebec from March 16-20, 2002 to train the regional coordinators on CBM;
iv.   Deployment of the coordinators to initiate CBM from March 2002 to March 2003;
v.   Mid-term evaluation of regional coordinators' experiences across Canada;
vi.   A mid-term workshop held in Canmore, Alberta from October 3-8, 2002 to share experiences, re-assess priorities and discuss post project funding;
vii.   Community monitoring activities that far exceeded project expectations;
viii. Final evaluation of the conceptual framework and synthesis of lessons learned;
ix.   Creation of an enhanced conceptual framework for Community Based Monitoring;
x.   Publication of a summary document: *Improving Local Decision Making through Community Based Monitoring: toward a Canadian Community Monitoring Network.*

3.0 Conceptual Framework to Guide the Community Based Monitoring Initiative

In order to achieve the goal of developing a conceptual framework to guide the Community Based Monitoring initiative and provide support to the regional coordinators, research was first directed toward an extensive literature review and case study analysis.

The need for a CBM conceptual framework became apparent as the project team began to think through project design issues around managing 12 regional coordinators across the country. A broad conceptual framework to guide their efforts was necessary to ensure a relatively consistent approach and to be able to evaluate project outcomes.

A review of the CBM literature suggests that some important work has been carried out on CBM in Canada (Appendix 1A). Efforts in the areas of protocol development (EMAN, 2002; Au, et al., 2000; Watershed Report Card), providing assistance to other groups in need of monitoring expertise (CEW, 2003), quality assurance and verification of CBM data (Au et al., 2000; McLaughlan & Hilts 1999; Stokes et al., 1990); overall description of CBM (Bliss et al., 2000) and sharing of CBM initiatives through initiatives such as the Volunteer Monitor (National Newsletter of Volunteer Watershed Monitoring, 2000) have provided important background to this initiative. With the exception of Bliss et al. (2000); however, little has been recorded in the literature on how to establish and coordinate CBM groups or networks.

3.1 Methodology

A two-part methodology was developed to meet the research objectives of this component of the initiative in the form of a literature review and case studies. The first part of the methodology was a literature review.

The second part of the methodology involved the development of a series of case studies of organizations that involved community initiatives focused on environmental and sustainability matters. The case studies included:

i.   Atlantic Coastal Action Program (ACAP);
ii.   Model Forest Program (MFP);
iii.   Local Agenda 21 (LA21);
iv.   Ontario Environmental Advisory Committees (EACs);
v.   Canadian Parks Partnership (CPP);
vi.   Citizens Environment Watch (CEW);
vii.   Carolinian Canada (CC);
viii.   The Community Action on Air Quality (CAAQ);
ix.   Biosphere Reserves (BRs);
x.   Remedial Action Program (RAP);

The case study approach was used to ensure that this initiative learned from the experiences of others in the area of creating and maintaining community-based groups. The case studies provide insight into the establishment process, how communities were engaged, community capacity building and policy and decision-making influence (see Appendix 3A for case study analysis; Appendix 3B for the justification of case study selection). The case studies analysis was based on a phone/email survey (refer to Appendix 3C; Appendix 3D for the list of organizations contacted). The case studies that were chosen are leading examples of community-based initiatives addressing environmental and sustainability matters.

3.2 Conceptual Framework to guide the CBM initiative

The findings from the case studies and supporting literature review resulted in a two- phased conceptual framework to guide the CBM initiative and provide support to regional coordinators trying to engage their communities in CBM (Fig. 2). The two phases and their main components are presented below in the same format provided to the regional coordinators during their training in March 2002 (as outlined in section 2.3).

Phase I: Establishing CBM	Phase II: Operationalizing CBM
• Reconnaissance • Consultation & Outreach • Champion Identification • Governance Analysis • Partnership Development • Membership Skills Assessment • Organizational Structure	• Capacity Building • Visioning • Communication Strategy • Ecological Monitoring • Achieving Influence • Fundraising • Project Management

Figure 2. Components of the conceptual framework for guiding the CBM initiative (Whitelaw, 2002).

Phase One: Establishing CBM
Phase one involves developing the infrastructure necessary to launch CBM in a particular community. Six related tasks are involved.

Reconnaissance: The first step toward CBM group establishment should involve a reconnaissance survey of the groups, government agencies, networks etc. in place within the community that have a role or influence on environmental planning, management, assessment, monitoring and reporting. The reconnaissance survey will familiarize the regional coordinator with the local community, initiate partnership building, and contribute to the governance and institutional analysis. As standard practice, coordinators should keep a log of all meetings attended and individuals met (e.g., address information).

Consultation and outreach: Once the regional coordinator has completed the reconnaissance, consultation should be initiated. Experience from the case studies suggests that the consultation net should be cast wide, seeking individuals and groups that might be

interested in ecological monitoring, whether directly involved in environmental matters or not. Numerous outreach and consultation techniques have been used. Some of the notable approaches include newspaper ads, meeting with NGO boards, TV and news stories and mailings from political leaders. Once coordinators feel the "message" of a CBM initiative forming in the community has been successfully delivered, personal invitations to everyone the coordinator has met and invitation to the general public through the media should be distributed. The invitation should invite all to attend a "founding" meeting of the initiative. The "founding" meeting should be aggressively marketed and designed to inspire individuals and groups to join.

Identification of Champion(s): Experience from a number of the case studies indicates that a champion(s) within each community is needed to drive the creation of community-based initiatives. Unless one very committed champion(s) is secured in each CBM croup it is unlikely that the coordinator will achieve the potential of CBM envisioned through this initiative. A "marketing brochure," reconnaissance survey and consultation outreach will all contribute to finding the champion(s). This individual should emerge as a leader during the "founding meeting" or shortly after.

Governance and Institutional Analysis: With the champion(s) identified and engaged with the CBM group, the coordinator should initiate a governance and institutional analysis of the community focused on environmental matters. The analysis should identify and confirm the main "players" with respect to environmental monitoring, land use and environmental decision-making etc.

Partnership development: Experience from the case studies indicates that support from a government agency also contributes to the successful formation of community groups. The round-table approach appears to be valuable allowing diverse stakeholders to explore possibilities that might not otherwise have been identified as options. The goal should also be to work toward institutionalization, as this has proven valuable to numerous groups. [For the CBM initiative, coordinators should use the credibility of CNF and EMAN to enhance their ability to build partnerships. CNF is respected in the NGO community and EMAN in the environmental monitoring field. Coordinators should work from this strength.]

Membership skills assessment: Once interested individuals and groups have come together, the coordinator should undertake a skills assessment of participants. This may be undertaken through round-table discussions, interviews or surveys. The information will be important to help determine the optimum organizational structure for the group. The skills assessment will also indicate who has the capacity to deliver on group establishment tasks.

Organizational Structure: Discussions on the optimum CBM organizational structure for each individual group should be guided by the coordinator and led by the champion(s) of the group. The coordinators should provide ideas and options including:

- Creation of a new group to guide CBM
- Coalition of interested groups coming together to form a CBM network
- One strong existing group assuming CBM responsibilities

- NGO/Government partnership to establish CBM

All options should be explored in light of the governance and institutional analysis and skill levels of involved individuals. Depending on the organizational structure selected, various administrative details will need to be addressed including such matters as incorporation, charitable status, and selection of board members, etc.

Phase Two: CBM Operationalization

The second phase focused on CBM implementation. This phase ultimately involves actual monitoring, analysis, information sharing and contributing to local decision-making in support of sustainability. The monitoring issues addressed in this phase are: preparation of a comprehensive inventory of existing monitoring in the community; identification of existing information on ecosystem status and trends; identification of gaps in existing monitoring; selection of monitoring themes based on the community vision (see below); selection of tested monitoring protocols; protocol training; field work; verification of data; data evaluation; and reporting. Monitoring is expected to focus on ecosystem issues initially and to extend to social, cultural and economic issues subsequently. Seven tasks are included in this phase:

Capacity Building: The degree of community capacity building required will need to be determined by the group (with help from the coordinator) based on a membership skills assessment undertaken (discussed above). [The Training Manual and Planning Guide developed for the CBM initiative regional coordinators workshop provided training material required for the operation of the CBM group.]

Visioning: Visioning is an important step in the development of any group. CBM groups should develop a vision of the desired future and then use this vision to identify issues of importance to the group. The vision and issues should then be linked to the type of monitoring to be undertaken. The link between the vision and monitoring will ensure the community is tracking whether it is headed toward its desired future. This will ground the monitoring and justify the effort.

Communication strategy and plan: The importance of a communication strategy cannot be under-estimated. Marketing concepts and branding ideas may be among the more powerful tools available to CBM groups to achieve influence. This relates to their unique position of generating data and information that can be communicated to government and the community.

Ecological Monitoring: Monitoring is the focus for Community Based Monitoring. Attention to the following matters will be required: comprehensive inventory of existing monitoring in the community; select themes for ecological monitoring based on the vision and issues identified; select existing and tested ecological monitoring protocols; develop significance tests; reporting strategies.

Achieving influence: The CBM group should identify strategies to be used in achieving influence. Strategies should be identified for each of the four main ways NGOs influence decision making - setting agendas, negotiating outcomes, conferring legitimacy and implementing solutions (Simmons, 1998). The strategies should be built into the communication plan, data reporting strategies, outreach, etc. The role of the media should be assessed, a list of allies should be compiled and advocacy procedures developed. The group should actively pursue institutionalization to build political opportunity.

Fundraising: Fundraising is a critical issue. To ensure continuation of CBM groups, each group should place fundraising at the top of their agenda. Experience from the groups surveyed suggests that multi-strategy fundraising work best – support from government, foundations and in-kind donations. [Similarly for the CBM initiative, the Project Team should commit to working on long term funding for the group. Attention to this issue early will ensure a smooth transition post VSI.]

Work plan/project management: – CBM groups should all undertake work-planning exercises so that operations are carried out in an efficient and effective manner. Work planning should also be accompanied by strong project planning. These tools ensure that all participants have full knowledge of the particular project underway and the overall direction the group is moving.

The tasks in each phase are not meant to be necessarily undertaken in sequence and some may occur concurrently. Certain communities with existing capacity may choose to skip certain tasks.

4.0 Evaluation of the conceptual framework

In order to meet the goal of evaluating the conceptual framework, a series of 26 interviews were conducted with regional coordinators over a twelve-month period. Below, an analysis of approaches used in the 31 communities tests and critiques the original conceptual framework that guided the CBM initiative. Research objectives, methodology, and a detailed analysis of the framework's components are provided below.

4.1 Objectives

In order to provide a comprehensive assessment of the conceptual framework, this evaluation used in-depth qualitative research throughout the pilot year to address the questions:

i.   To what extent did the practical experiences of coordinators and their communities confirm the validity of the conceptual framework for Community Based Monitoring?
ii.   How can the framework be enhanced based on the results of evaluation?

More specifically, the six research objectives were:

1. To identify various applications of the framework from a series of interviews;
2. To test the validity of each of the fourteen components of the framework;
3. To isolate key variables (or factors) for successful implementation of CBM;
4. To test the validity of the factors for success against coordinators' experiences;
5. To assess and critique the original framework; and,
6. To enhance the framework based on the evaluation process.

4.2 Methodology

The methodology for the evaluation of the framework was as follows: (1) a literature review was completed (Appendix 1A); (2) primary interviews with 12 regional coordinators during the second quarter of the pilot year to draw out their experiences applying the CBM conceptual framework; and (3) secondary interviews with 14 regional coordinators during the fourth quarter to test and confirm emergent themes and factors for success. Further detail regarding the evaluation methodology is presented in Appendix 4A.

In addition, several complementary sources of data were used to enhance analysis including community web sites, coordinators' conference presentations, and randomly selected third quarter reports from regional coordinators. Each of these sources was consulted to test the consistency of interview results throughout the CBM initiative.

4.3 Analysis of Approaches

Overall, the evaluation showed that the original conceptual framework provided important strategic direction for the Community Based Monitoring initiative. Detailed analysis of each of the fourteen components of the original framework based on the regional coordinators' experiences throughout the initiative is presented below.

Each of the following fourteen sections highlights a component of the original framework (from Whitelaw, 2002) and details how regional coordinators applied each component for establishing Community Based Monitoring. The analysis below provides a critique of the framework by highlighting some characteristics that are not adequately developed in the original conceptualization. Specifically, the following analysis:

1. Demonstrates the versatility of CBM approaches and applications.
2. Illustrates the iterative nature of CBM and the synergy of its components.
3. Highlights the importance of an adaptive approach to implementing CBM.

In addition, examples are provided in-text and more detailed illustrations, including quotations from the interviews, are given in boxed text.

Each section of the analysis concludes with a checklist of approaches utilized in the CBM initiative (amalgamated in Appendix 4B). They are meant to represent some of the core activities within each component. They are not intended to be an exhaustive blueprint, but a suite of approaches that, when combined, give an idea of the diverse ways that communities have engaged with ecological monitoring within the scope of the CBM initiative. Most importantly, they provide a toolbox of diverse and versatile approaches that can be adapted to other communities across Canada (further developed in section 5.0).

Assessment of Phase I: Establishing CBM

Phase I: Establishing CBM	Phase II: Operationalizing CBM
• **Reconnaissance**	• Capacity Building
• **Consultation & Outreach**	• Visioning
• **Champion Identification**	• Communication Strategy
• **Governance Analysis**	• Ecological Monitoring
• **Partnership Development**	• Achieving Influence
• **Membership Skills Assessment**	• Fundraising
• **Organizational Structure**	• Project Management

4.3.1 Reconnaissance

Information gathering and relationship building in the area of reconnaissance represents a critical step for building the foundation of CBM. Coordinators prepared community profiles as a means to identify the key actors involved in environmental decision-making and continue to build their knowledge through meetings and contacts about potential partnerships. A few coordinators extended the community profile activity to a formal, in-

depth exercise as the basis for future visioning (Box 3). Most coordinators did not appear to keep detailed logs of their many meetings, although much of their work was captured in the quarterly reporting process.

BOX 3: *Quentin van Ginhoven of Otterburn Park, Quebec and Stephane Tanguay working with Pointe Fortune, Quebec, followed the Sonoran Institute[1] model for creating a profile of their communities. As Quentin said: 'We want a solid profile of the community because our goal is to get as many people as possible interested in the program. The coordinators could do the profile themselves, but we want a small group of residents to do the profile and then have citizen meetings. Some of them may become leaders. We want to have a socio-economic profile as well as seeing the monitoring that has been done. Our report will show trends of land use and development in the area.'*

Formal analysis was combined with the 'snowball technique' of gathering contacts and building a network of connections. As coordinator, Melanie Watt of the Biosphere Institute of the Bow Valley in Canmore, Alberta, pointed out, community workers have long been doing governance analysis on an informal basis. She joked: 'a lot of capacity building and reconnaissance isn't called that...I call it "coffee."' In fact, coordinators cited one-on-one meetings with community members as the most successful method of garnering local participation.

Strategies for engaging people and building relationships in the community are versatile: holding small group meetings, contacting key individuals ('insiders') of existing groups, using a local 'gatekeeper' to build credibility of an outsider, assessing local priorities, concerns and goals, and providing opportunities for networking and involvement.

Reconnaissance also used the tool of community mapping[5] to identify existing monitoring activities and an assessment of related efforts, such as river clean-ups. Reconnaissance combines with the membership skills assessment component, making coordinators aware of local skills and local capacity needs. Most coordinators are also interested in mapping existing ecological monitoring efforts in their region, as a visual inventory and outreach tool (BOX 4).

BOX 4: *Director of the Biosphere Institute of the Bow Valley in Canmore, Alberta, Melanie Watt, created a set of four maps and a database of long-term environmental monitoring activities since 1990. They show the locations and dates of more than 100 monitoring studies on wildlife, water, air quality and climate change. The maps will be reviewed by local scientists, researchers, and land managers and used as a tool for education and decision-making.*

[5] Community mapping provides an inclusive and graphic framework for people to affirm and pool their experiences and knowledge about their home place. In Canada, see www3.telus.net/cground/readings or read about the British model for community mapping at www.commonground.org.uk/parishmaps.

It is important for CBM participants to avoid duplicating existing monitoring, and using standardized protocols. Although such mapping processes help to identify active groups, available monitoring data and gaps, it can be very time-consuming, particularly for those areas that have an abundance of monitoring occurring, without much coordination.

Reconnaissance	❑ Conduct community profiles ❑ Identify existing monitoring activities ❑ Identify local concerns and monitoring priorities ❑ Use formal surveys or informal contacts ❑ Meet one-on-one to engage potential participants

4.3.2 Consultation & Outreach

The consultation phase is often a foundation for later partnership development as well as a means to identify potential champions. For consultation, coordinators used a variety of approaches, both top-down meetings with community leaders, politicians and government agencies, and bottom-up starting with non-profit organizations, interested individuals or schools. Most adopt a combined approach eventually, but their initial contacts or introduction of the CBM concept largely depends on their professional affiliation.

Six of the twelve regional coordinators had an institutional affiliation to an existing environmental organization, community development agency or academic institution. The others worked as independent consultants to the communities. In all cases, building relationships, trust and credibility are important aspects of consultation. For some coordinators, being residents of the communities they worked with was an important key to their success. In smaller communities, 'outsiders' typically have a more difficult time building trust and credibility and need to be introduced through respected community leaders or 'gatekeepers.' In the Northwest Territories, regional coordinators strongly expressed the need for building relationships and credibility before any programs could be initiated.

Rather than appealing to general public interest, most coordinators adopted a targeted approach by using small group meetings to secure interest, or working with those groups already interested to maximize the success of their founding meetings. For the larger communities, open 'founding' meetings may have created unrealistic expectations and an unmanageable number of potential volunteers for a single coordinator. Instead, consultation and outreach was most often a gradual process that involved 'snowballing' existing contacts with new ones and spreading the word to interested parties.

For those that held community forums of some kind, they secured attendance through personal invitations, reminders and media coverage.[6] The meetings often incorporated guest speakers appealing to local concerns as an added incentive. Several coordinators opted for a hands-on approach, instead of a formal meeting process, and invited participants to an

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[6] For an example of newspaper coverage of the CBM initiative in Alberta, visit the Western Wheel archives at http://www.westernwheel.com/020515/news-environmental.html and http://www.westernwheel.com/030108/news-environment.html

activity like a river clean up or a monitoring training workshop. Again, these were based on what was learned during the reconnaissance component in terms of which approaches were most locally appropriate.

As will be discussed in sections on partnership development and capacity building, consultations can have the negative effect of disempowering participants when their opinions are not reflected in final outcomes. Therefore, it may be important to adopt some of the strategies identified from the experience of regional coordinators and CBM participants.

Consultation & Outreach	❑ Build relationships and trust
	❑ Use top-down and bottom-up approaches
	❑ Link existing groups and facilitate their dialogue
	❑ Use local media to enlarge project profile
	❑ Hold multi-stakeholder meetings in an open forum
	❑ Host open houses, workshops, speakers and training

4.3.3 Champion Identification

Interestingly, most of the coordinators rated this component as critical to success, particularly for the continuity of leadership. More than half of the coordinators have confirmed local champions and many others have potential champions identified. They range from individual community activists and leaders, to resident landowners, retired academics, and small organizations. The key benefits of institutional champions are their existing capacity to coordinate CBM and deliver information to the wider community.

Types of Champions	Examples of CBM Champions
Individuals	Landowners, naturalists, teachers, scientists, etc.
Research institutions	Aurora Research Institute, NWT
	Biosphere Institute of the Bow Valley, AB
Protected areas organizations	Mount Arrowsmith Biosphere Reserve, BC
Non-governmental organizations	Environment Hamilton, ON
	Bow River Basin Council, AB
Governmental partnerships	Otonabee Conservation, ON
	Atlantic Coastal Action Plans, NS and NB
Local government	Town of Okotoks, AB
	Town of Turner Valley, AB
	Town of Black Diamond, AB
Watershed associations	COVABAR Watershed Committee, QC
	Fredericton Watershed Association, NB
	Canaan-Washadamoek Watershed Association, NB

A major factor for sustaining citizen engagement in monitoring is how effectively leadership is transferred from the coordinator or sponsoring agency to local champions and facilitators. In the establishment phase, champions are particularly important to build capacity, enhance coordination and potentially provide continuity.

CBM regional coordinators view themselves as interim facilitators that have the capacity to begin establishing community-based monitoring processes (e.g., through capacity building, partnerships and fundraising). The next challenge, once CBM is operationalized, is to transfer leadership and withdraw themselves as coordinators. In some cases the transfer is expected to be partial, where coordinators remain engaged as participants or as facilitators through their existing organizations, but for others leadership must be completely transferred.

Shawn Dalton in Fredericton, New Brunswick, describes her approach to transferring leadership as 'working herself out of a job.' In other words, she does not assume that resources will be available in the future, or that new volunteer groups will continue to exist. This process is expected to take more than the initial year, possibly two. Her experience with other groups is: 'By building capacity with our partners or by building up a program in partnership with somebody else that eventually would lead to us withdrawing from it...We would help establish something and leave it behind, ...but the program that we were working on didn't disappear just because we disappeared.'

Coordinators are acutely aware of the need to sustain monitoring beyond the first year. As Marieka Arnold of the New Brunswick Field Naturalists expresses, coordinators are hoping that an emergent national network (the Canadian Community Monitoring Network) can sustain involvement. 'When you are approaching people in the community, you want to assure them that this is a long term ecological project.' Champions are one resource that might facilitate a transfer of leadership, help provide continuity and sustain the program's profile.

Champion Identification	❑ Identify champions (both individuals and institutions)
	❑ Secure their commitment and build their capacity
	❑ Link champions within community and across region
	❑ Transfer leadership to champions, where appropriate

4.3.4 Governance Analysis

This component of establishing Community Based Monitoring builds on reconnaissance so that social and political relationships can be better understood. Understanding local systems and how they work is also important to strategic CBM work planning, outreach and communication. The role of local and regional institutions, norms and decision-making structures are assessed in relation to opportunities for CBM to achieve influence.

Most coordinators seem to feel that governance analysis is an important but on-going component that requires time and a network of contacts to connect them to key players. Formal network analysis is recommended as a tool for all coordinators, not only to provide local information for CBM groups but also to act as a comparative research tool for communities undertaking CBM (Box 5). However, governance analysis is often rooted in informal processes, such as meeting people and learning "who does what" in the community.

BOX 5: Network analysis, developed by Shawn Dalton of Fredericton, is one tool that could contribute to the identification of variables for successful CBM. The survey identifies the different stakeholders and their involvements or role in the community, as well as information on existing environmental initiatives (Appendix4C).

Governance Analysis	❑ Identify local groups and their roles ❑ Understand social and political context ❑ Conduct formal actor network analysis or surveys ❑ Identify leverage points and partners for influence

4.3.5 Partnership Development

The Community Based Monitoring initiative confirms that building partnerships is crucial for success. Having the support of other agencies and organizations expands the network of available resources, expertise and contacts. Partnership development can contribute to the identification of a champion, improve the effectiveness of consultation and outreach, and help to shape future organizational structures for community monitoring. Working with others is one of the main ways to build capacity and maximize local success.

The importance of having diverse stakeholders meet together to exchange different views and identify common interests and concerns cannot be underestimated for some communities. Where the process is inclusive to diverse interests and maintains open communication, respectful relationships can often be formed. Whether multi-stakeholder partnerships create institutionalization of monitoring over the long-term or simply contribute to the community's acceptance of CBM, they are a valuable component.

While many communities have engaged with government agencies, non-profit organizations and small community groups, only some have engaged the private sector. Industry and business represent a strong potential source of support. In the Canmore, Alberta area, some industries have offered to share their monitoring activities and may collaborate as partners to expand CBM. On Vancouver Island, where many monitoring programs are occurring, corporate sponsorship of programs is quite common (Box 6). And in the Northwest Territories, where new forms of governance are emerging, legislated models for multi-stakeholder dialogue ensure industry's participation.

Box 6: Centra Gas, on Vancouver Island, B.C. has been working with the Lantzville Streamkeepers, Nanoose First Nation, and the Department of Fisheries and Oceans to construct a new channel for Knarston Creek in Lantzville. Old channels were causing erosion and sedimentation, creating barriers to fish migration, and threatening to expose the Centra Gas transmission line. Volunteers took a two-day PhotoPoint monitoring course, with support from regional coordianator, Tanya Laing. PhotoPoint monitoring provides a long term, permanent, visual record of site conditions to gauge the effectiveness of the new channel. Local Streamkeepers would then be able to monitor the creek and share results with Centra Gas and the federal government.

It is important to recognize that multi-stakeholder dialogue does not necessarily provide citizens with more power or influence in decision-making. As some coordinators suggested, conflict may be enhanced when stakeholders express different and seemingly irreconcilable values, and participatory processes should not be assumed to be the best form of conflict resolution or mediation. Indeed, participatory processes require careful consideration in their design and purpose to maximize the benefits of stakeholder involvement and make public participation meaningful.

Coordinators identified three key areas of consideration for engaging diverse groups to work together. First, a neutral forum is needed that is open and transparent. Many described the need for a non-political, non-threatening, non-confrontational environment. Others pointed out the equal importance of a trusted and neutral facilitator who 'does not take sides.'

Second, stakeholders must demonstrate a willingness to work together. Coordinators commented that previous or existing cooperation on other issues is helpful, but having a common goal or challenge really motivates and empowers participants to collaborate. Where stakeholders have a history of conflict, the right environment combined with positive motivation can help. Often initial differences can be transcended by the recognition of a shared identity, such as living in the same watershed. However, it is important to note that while multiple stakeholders may effectively develop goals and a plan, the implementation of that plan and the division of responsibility may be neglected.

Third, for diverse groups to work together there are a number of strategic techniques that have been successful and are outlined in the checklist below. While these strategies may work well in some cases, particularly smaller communities that are new to ecological monitoring or institutions that have a long history of environmental partnerships, in other cases such collaborative models are not necessarily achievable.

Significant institutional barriers to collaborative management may exist, and members of government and industry may feel threatened by environmental reporting, especially if they are accountable for negative impacts. These conditions will certainly affect the type of partnerships that can be built in certain communities.

Partnership Development	❑ Identify partnership opportunities
	❑ Identify priorities and respond to concerns
	❑ Conduct governance analysis (know the system & players)
	❑ Invite partner involvement
	❑ Adopt a multi-stakeholder approach
	❑ Encourage dialogue, keep communication lines open
	❑ Communicate shared goals
	❑ Use examples of success
	❑ Hold open houses, community forums, training sessions

4.3.6 Membership Skills Assessment

Establishing Community Based Monitoring requires an assessment of local skills, interests and needs. As suggested in the reconnaissance component, coordinators should assess local priorities for ecological monitoring and identify local experts and local knowledge sources. An assessment of skills helps to identify existing capacity and capacity needs; however this is more likely to be done informally rather than through formal surveys.

Many coordinators could quickly identify experts in their community, participants' skills with monitoring and their need for training. They acquired this information through personal contacts made in the community, and through informal consultation and outreach. One exception is the use of a formal survey to assess local environmental concerns, current levels of participation and volunteers' interests in ecological monitoring (BOX 7).

BOX 7: Meredith Carter of Otonabee Conservation in Peterborough, ON, conducted formal membership skills assessment using a survey distributed at information open-houses. These drop-in sessions were open to the public and profiled all of the NatureWatch protocols for community monitoring. The survey asked the following types of questions: (1) What are your areas of interest and your main local environmental concerns? (2) Are you participating, or would like to participate, in an ecological monitoring program and what kind? (3) Are you interested in participating in a watershed committee to oversee monitoring?

Membership skills assessment is one of the key strategies for establishing CBM. As coordinators suggest, this component goes beyond learning of available skills and future training needs. It involves uncovering sources of local knowledge, historical data, and for some communities, integrating a wealth of traditional ecological knowledge. Clearly knowing why people want to participate – what motivates them – and what their expectations are of the program is essential.

Without this information, monitoring programs will fail to appeal to local interests and concerns. Similarly, the risk of raising unrealistic expectations will result in a lack of commitment from participants and partners. Many commented on the need to tailor CBM programs to the unique interests and needs of the community in order to secure buy-in from champions and volunteers.

Participant expectations of monitoring included accessible protocols and training, on-going coordination and communication, and meaningful involvement in terms of having influence on decisions or having monitoring results integrated into policies and plans.

Participant Expectations of CBM	Description
Monitoring & Training	Simple protocols; training; staff support
Coordination	Ongoing coordination; resources; funding
Communication	Updates and reporting on trends
Meaningful Involvement	Influence government; have action taken

When asked what motivates people to engage in monitoring programs, coordinators consistently responded with three types of motivations:

Participant Motivations for CBM	Description
Sense of stewardship	Motivated to care for their environment
Environmental or health concerns	Motivated to get information and answers
Contribution to public policy	Motivated to make a difference

First, a strong sense of place and stewardship motivate people to become involved. They want to learn more about their community and about their environment.

Second, environmental concerns or health concerns catalyze community action, particularly when that action is expected to produce valuable scientific data. In many cases, people do not feel that industry or government monitoring is adequate or can be trusted and they want to take direct action. Most people involved want to make a meaningful contribution to their community and gathering ecosystem data is one means to do that. In Hamilton, Ontario, participants are empowered to take issues into their own hands. Brian McHattie of Environment Hamilton speculates that monitoring is about "controlling your own destiny...you don't have to rely on someone else to interpret the data, you have them yourself...and can do what you want with them."

Third, coordinators feel that many communities are motivated by the desire to participate in policy development. They want the opportunity to inform decisions with ecosystem information that is scientifically valid, and in some cases collaborate in the design of environmental management plans.

Yet, coordinators are equally aware of the risk of local agendas that are trying to 'prove something' through monitoring. While monitoring may generate findings that require environmental remediation, ecological monitoring should not be driven by the expectation that environmental change is inherently negative. Public understanding of science is needed in order to balance these kinds of expectations with the need for careful study of long-term trends.

Membership Skills	❑ Identify motivations for participation ❑ Assess skills and knowledge of participants ❑ Determine expectations of members ❑ Evaluate capacity and training needs

4.3.7 Organizational Structure

General findings suggest that a one-year establishment period is too short to create new organizational structures for CBM. Although creating an optimum structure for community-based monitoring groups is a key component of the conceptual framework, coordinators have adopted a variety of approaches, as they assess community priorities and existing structures. In some cases it is too premature to know what the communities will decide. A few new

groups have been created, including multi-stakeholder groups such as watershed associations (BOX 8).

BOX 8: Interestingly, some of these new groups have shown a natural progression to connecting partners across landscape scales. In the Canaan-Washademoak area of New Brunswick, people are working together across jurisdictional and community boundaries to form a Watershed Association at a landscape scale. Shawn Dalton states that 'part of the problem is that we are working at the watershed level - which is a good thing. But by definition also means that you are working with multi-jurisdictional politics.' While it is important to recognize ecological rather than just political boundaries for CBM, it appears that the complexity of organizational structures increases when working at the landscape scale.

In addition, several existing groups have a mandate for ecological monitoring and have begun to develop community-based programs as well (BOX 9). In larger areas, where numerous ecological monitoring programs are occurring, coordinators are actively trying to facilitate better communication and collaboration among them prior to initiating any formal structure. By contrast, where no existing monitoring exists, building partnerships and identifying champions precedes the possibility of establishing new organizations.

BOX 9: The Northwest Territories Cumulative Impact Monitoring Program (CIMP) will look at how all uses of land and water and deposits of waste, affect the environment of the NWT now and in the future. As a requirement of the Gwich'in and Sahtu land claim agreements, the Tilcho [Dogrib] Agreement, and Part 6 of the Mackenzie Valley Resource Management Act, the monitoring program will: encourage community based monitoring and capacity building; "fill the gaps" in current monitoring activities; report on the health of the environment, including ecology and community wellness and other socio-economic factors; help with better decision making to protect the environment; include both scientific and traditional knowledge; and help coordinate monitoring and reporting in the NWT, making monitoring information available to the public.

Organizational structure is a particularly interesting component for further study of what structures make monitoring most successful or whether local context and existing governance structures determine the ideal organizational configuration. One of the most striking developments of the CBM initiative is the emergence of a national organizational structure – the Canadian Community Monitoring Network (CCMN). Although in its infancy, the CCMN has incredible potential for communities to share experiences and resources through a broader network.

Organizational Structure	❑ Expand or restructure existing groups
	❑ Initiate new groups
	❑ Link organizations within a broader region or landscape
	❑ Identify a central node for leadership and communication

Assessment of Phase II: Operationalizing CBM

Phase I: Establishing CBM	Phase II: Operationalizing CBM
• Reconnaissance • Consultation & Outreach • Champion Identification • Governance Analysis • Partnership Development • Membership Skills Assessment • Organizational Structure	• **Capacity Building** • **Visioning** • **Communication Strategy** • **Ecological Monitoring** • **Achieving Influence** • **Fundraising** • **Project Management**

Although in practice, establishing and operationalizing Community Based Monitoring run together, they are separated in the conceptual framework for simplicity. Although regional coordinators were told that the components of each phase did not have to be undertaken sequentially, many stressed the difficulty they had trying to implement the framework in its original form. Many suggested that the framework presented a false sense of linearity – and that they were always involved in multiple activities simultaneously.

The following sections present results from the interviews as applied to the assessment of phase two: operationalizing CBM. Again, examples are provided in-text and more detailed illustrations, including quotations from the interviews, are given in boxed text. In this phase, capacity building, visioning and communication strategies contributed to the activities of ecological monitoring, fundraising and project management.

4.3.8 Capacity Building

Capacity building is one of the major requirements for effective implementation of Community Based Monitoring. Also a major theme in community development literature, capacity building needs must first be identified (as a part of reconnaissance, membership assessment, and consultation) and met in at least three major areas: social, technical, and coordination.

Social Capacity Needs for CBM	Technical Capacity Needs for CBM
Facilitation training	Ecological monitoring
Consultation & outreach	Protocol training
Communication & marketing	New protocols
Governance analysis & influence	Data management (storage, access)
Public education of CBM benefits	Information management (analysis)
Public understanding of science	Reporting & feedback of results

Social Capacity

Social capacity enhances the success the other components of the framework. Social capacity building should be seen as the means to enhance social capital, through improved social networks and public participation in civil society. It is important to note that social capacity needs are often much greater at the level of program management than with volunteers who

already have the time, interest and energy to devote to a program. As explained in the section on achieving influence, institutional capacity and political will are often lacking more than community capacity. To effectively engage participants in CBM, strong facilitation is usually needed to connect partners, conduct meetings, and maintain communication flows (Box 10).

> *BOX 10: For the community of Black Diamond, Maureen plans to build capacity for facilitation, not just for ecological monitoring skills. Wendy Aupers, the communications officer for the near by town of Okotoks, describes the strategy of using local expertise to 'Train the Trainer' in facilitation skills: 'We're going to bring together a mix of people: councillors, volunteers, stakeholders, groups and do a [training session] on how to be a good facilitator. So if Maureen leaves or we need continued support, we have people who can facilitate in the community. They can lead themselves. Then we're going to do the visioning after that. Pull together a broad representation of people and then we'll have facilitators trained from the community to assist in those sessions.*

For those communities with either little interest or with excessive volunteer 'burn-out,' building capacity through education and awareness is an important step. Across the interviews, the theme of scientific understanding emerged as a key factor for effective citizen participation in ecological monitoring. Where the benefits of CBM are not apparent to people, they need to be articulated and then realized. While having a membership that is interested and willing to engage is of primary importance, a related need is to make their involvement meaningful.

Another potential source of meaning is to link local efforts to national ones. Several coordinators reported being part of an emergent national network, like the Canadian Community Monitoring Network (CCMN), motivates people. Marieka Arnold, from New Brunswick, commented on the significance of linking local efforts to a national initiative: 'The people that you talk to in each of the communities are very keen on the whole national network idea...It takes it from the local to the national, and that is quite exciting for people.'

Meredith Carter, working in Peterborough, Ontario with Otonabee Conservation agrees. 'Everyone gets excited because it's a federal program. When you say volunteers from across Canada are doing this, they really feel a part of something.' Maureen Lynch records a similar experience based on working with school groups in Okotoks, Black Diamond and Turner Valley, Alberta. She says: 'It's not just a classroom assignment. They are feeling like they're collecting valuable data for their community. Like they are part of something bigger.'

However, Tanya Laing's experience with environmental groups in Nanaimo, B.C. illustrates the diversity of experiences across CBM communities. Her perception is that volunteers are overworked and have little interest in engaging with national initiatives. 'They are so busy dealing with issues that are in their own backyards that it is not really a priority for them. They just don't have the capacity.'

Technical Capacity Building

Second, technical capacity needs to be built for monitoring particularly for data collection and management. Technology is needed in most communities to facilitate data management; without the means to analyze data, it is collected with no greater purpose and people can quickly lose interest. Locally, ecological monitoring skills need to be developed. Results from interviews emphasized the need for simple protocol training for monitoring. For scientifically valid contributions from citizens, data must be collected on parameters that make use of scientific protocols. With certain protocols, training materials are provided and are easy to learn and easy to use. According to results, there remain a number of criteria for effective use of monitoring protocols that are not necessarily met, including:

Protocol Criteria	Description
Accessible	Available to obtain and of reasonable cost
Tested	Fully developed, tested and packaged for community use
Appropriate	Appropriate language (for non-English speaking communities)
Clear	Clear goals and procedures
Comprehensible	Understandable concepts, familiar terms and use of examples
Resources	Sources for assistance, including contacts & trainers
Quality Control	Procedures or sources for quality control
Training	Training manuals and training sessions

While dozens of Community Based Monitoring protocols exist in Canada, coordinators frequently experienced problems matching community priorities with available protocols. At times, coordinators successfully engaged volunteers in the concept but failed to have the resources to engage them in monitoring. Either they could not find protocols that existed or the protocols they did find were still in development. This compounded the problems listed above for existing protocols. Protocols requested by communities were:

- Soil toxicity
- Benthic macro invertebrates
- Invasive plant and insect species
- Pesticide use (residential)
- Greenhouse gas emissions
- Lichens

In some cases, where monitoring protocols did exist, coordinators identified local experts to provide training to volunteers. Most communities found a way to use a 'Train the Trainer' model, where several people are given the skills and the techniques to train others in those skills. Local experts include: naturalists, academics, staff from government agencies, and facilitators from non-governmental monitoring programs.

In-kind support, as illustrated by the donation of time and expertise to training, has been one of the most significant ways of building capacity for CBM. In-kind support has been provided in the forms of: water quality monitoring equipment; data analysis and quality control through laboratories, colleges and universities; data storage in larger databases or clearinghouses; landowners' and schools' properties for terrestrial monitoring. Other forms

of in-kind support include: office space; resource people's time and travel expenses; and meeting supplies such as flip charts, coffee and doughnuts.

Community development literature suggests that evolving forms of participation be established to expand the ways in which volunteer contributions can be integrated into a program over time. While most coordinators were open to the possibility of volunteers performing a variety of tasks in addition to ecological fieldwork (e.g., data collation, analysis, entry, reporting and communication), they recognize the difficulty with engaging people in technical or repetitive exercises. As Melanie Watt observes from her experience with the Biosphere Institute: 'People are much more interested in going for a walk and pulling out noxious weeds than sitting down in front of a computer and entering data.'

While volunteers want to "make a difference," the work they do must be kept relatively simple and enjoyable in order for them to sustain their engagement. Participants' commitment to CBM can be challenged by complex or technical protocols, high demands for time and energy, and the need for routine data entry and skilled interpretation. Although not usually made explicit, one of the major motivations implied for CBM is the desire for social interaction in a natural setting with reasonable time demands.

Finally, social and technical capacity needs combine in certain areas. Volunteers need to understand scientific protocols through training, but they also need an appreciation of scientific principles such as rigour, repetition, sample size and quality control. Stéphane Tanguay explains that in his area of Pointe Fortune, Quebec 'people don't understand the definition of monitoring. [They don't understand that] monitoring can be a red flag to see changes that indicate more monitoring is needed.'

Several others recognize this challenge. As Mark Johnson of ACAP Cape Breton said: 'The only problem with getting some of these ecological monitoring protocols up in our area, for most cases to see any change you are looking at ten years - to see the big picture of what's going on. And even then it could be part of a shorter-term cycle.'

Tanya Laing suggests that Community Based Monitoring is a 'difficult concept for lay people to understand.' And as Meredith Carter concludes: 'People are just learning about this long-term concept.' Capacity needs to be built to move people from short-term public participation processes to longer term sustainable monitoring and public engagement.

Coordination Capacity

Results suggest that effective social and technical capacity building relies on strong coordination. Coordinators demonstrated their capacity to effectively engage partners, champions and volunteers.Yet, they also demonstrated capacity needs themselves in terms of facilitation training, communications, marketing and governance analysis for political influence (BOX 11).

BOX 11: *Capacity building for regional coordinators is an important element for success. Regarding the coordinators' training workshop, many commented on the need for capacity building in order to conduct governance analysis and achieve influence. Maureen Lynch said that: 'We didn't really talk about municipal politics. Monitoring is one tool, but politics is another. How do you link to the decision-makers? Well, who are the decision-makers?' This area was certainly a challenge for those coordinators that were working independently, without an affiliation to an existing group.*

Coordinators felt strongly that their role was to facilitate and to identify local priorities and capacity needs without imposing their own agenda. Quentin van Ginhoven says that he expects local priorities will come out during the public meetings in Otterburn Park, Quebec, and while he will not push any particular issues he may suggest options. 'I have my own ideas,' he says, 'but it is up to them.' Joleen Timko agrees that she will do as much as she can for Pincher Creek and the Peigan Nation, 'but ultimately they are going to have to do their own monitoring.' 'Our role is as facilitator, ' Marieka Arnold observes, ' not imposing top-down what they should be doing.'

As suggested in the discussion of champions, the other major element of coordination capacity is having an organizational node that provides continuity. For Stéphane Tanguay, one challenge is that he is viewed as a long-term facilitator of the monitoring program: 'I hope that I can get someone at the front in the fall, so that I can hide behind them and just facilitate' until the end of the year.

But Maureen Lynch says that the key is timing. 'Are the communities ready for it? What if there is a forest fire or some other disaster? The community is not ready. It has to come up as a priority and they have to be ready to engage.'

'Readiness' is an important element for any group, but is also difficult to plan. For some communities that are new to the concept of Community Based Monitoring, value of the program will need to be demonstrated, adequate capacity will need to be built and engagement may strengthen over time. In other communities that are highly engaged already in monitoring or similar environmental activities already, efforts may be directed to linking existing groups or investing in an effective organizational structure. Timing can be a critical factor, but capacity building that is sensitive to context and tailored to each community can help to increase local interest and commitment, regardless of whether a community is completely 'ready' or not.

Capacity Building	❑ Build social capacity (e.g., facilitation, partnerships) ❑ Educate participants about CBM values and benefits ❑ Establish effective communication mechanisms ❑ Build technical capacity (e.g., training, equipment) ❑ Use appropriate protocols and training ❑ Develop effective data management systems ❑ Maintain reporting and feedback mechanisms

4.3.9 Visioning

Visioning, while important in some cases, was not commonly considered an important step for developing strategic direction for CBM communities. There are perhaps two reasons for this. First, communities can identify common values and goals outside of formal visioning and second, about half of the thirty-one pilot communities had already initiated some kind of visioning processes in the past five years. For those groups that had an existing vision to build upon, this component was not considered important; it would be considered redundant to duplicate such a process (BOX 12).

> *BOX 12: Coordinators are very conscious about not duplicating visioning that has already been done. As Meredith Carter points out, more visioning in her communities may not be needed or wanted. 'The Otonabee Conservation Authority just did visioning as part of our strategic plan. We had a year-long public consultation for visioning about local environmental issues and what people think we should be doing. The plan came up with twelve main programs that should be created, and one of them was monitoring. There's been a lot of visioning around here recently.... The greater Peterborough area vision was done on a county-wide basis and it's also been done on a watershed basis.'*

Examples of community visions include:

- Regional District of Nanaimo, Official Community Plan, BC
- Mount Arrowsmith Biosphere Reserve Vision of Sustainability, BC
- Sustainable Okotoks, AB
- Vision 2020, Hamilton, ON
  ACAP Vision, Cape Breton, NS

Alternatively, communities may adopt a less formal approach to visioning. Shawn Dalton discovered that her communities of Canaan-Washademoak, New Brunswick, spontaneously identified a vision for monitoring at a public meeting and feels that additional visioning would be redundant: 'Without me prompting them to do it, they decided what they want to do is protect the existing water quality, make sure that it doesn't deteriorate any further in the face of all this development... and if it is possible, to develop and implement management plans for this area that enhance the water quality. Well that sounds like a pretty articulate vision to me... I'm not going to enter a huge visioning process when, by themselves, they came up with that. They have a goal and they can head for it.'

The diversity of communities again results in different applications of the framework's components. Although community-driven visioning is supposed to underpin CBM, other experiences challenge that assumption. In British Columbia, the Mount Arrowsmith Biosphere Reserve conducted a vision for sustainability. However, as regional coordinator Tanya Laing describes, local residents did not want to engage in the process. She says the Biosphere Reserve group held public meetings to ask the questions: what do you think is sustainable and what does sustainablity mean to you? According to Tanya, the Biosphere Reserve concluded that: 'People didn't want to decide what sustainability was, they wanted a

group like the Biosphere Reserve to say: these are some important issues in our community and here's how you can help. That's what people wanted. They wanted to take action. They wanted to be told what to do. They didn't want to go through this whole process. They wanted experts to tell them so that they could take action.'

Here, a local context of action-oriented volunteers denies the visioning process and reverts a scientific monitoring to the traditional expert/lay dichotomy. So while some communities have used visioning as a tool to link monitoring to broader policy directions, others simply may not want to devote the time to engaging with that particular process.

Visioning	❑ Make monitoring community-driven
	❑ Conduct formal or informal visioning
	❑ Build on existing visions and sustainability indicators
	❑ Link monitoring activities to indicators measurement
	❑ Re-assess visions periodically; celebrate success

4.3.10 Communication Strategy

Like capacity building, effective communication at all levels and stages of CBM appears to underpin its success. This theme developed in a number of ways throughout the pilot year, including internal and external marketing of CBM, internal and external data management systems, and horizontal and vertical communication within regional and national networks.

First, the need for internal marketing within the community was expressed. Although the conceptual framework advocates a marketing approach to information materials, and promotes branding to help achieve identity and influence, this aspect of communication represented a major gap for coordinators in terms of the lack of promotional and educational materials available to them at the beginning of the pilot year. Specifically, the coordinators stressed the need for business cards, brochures and an accessible website in both French and English, to be available at the start of their community work. Without them, they found that the CBM initiative lacked a consistent identity or vision, coordinators felt that they lacked credibility and some failed to provide interested volunteers and partner organizations with program information.

That said, however, most coordinators did make explicit attempts to communicate CBM internally (in their communities) through the use of media such as local newspapers and radio, other organizations' newsletters and websites, through environmental reporting and word of mouth. Since coordinators are aware of the need for public education, they will need to continue to communicate the values of monitoring and the necessity of long-term commitment to realize those values. Establishing monitoring also means identifying where there are needs for monitoring data and information. If CBM is to be guided by community needs and demand-driven by policy and planning needs, then communication is needed between decision makers and citizens, in an open public forum.

Another communication challenge for some coordinators is how to describe CBM and its multiple goals. One of the tensions for some communities is the dual mandate of the CBM initiative: the struggle to meet local priorities for monitoring and the need to feed information into national databases. Quentin van Ginhoven's community in Quebec is clear that establishing local monitoring for local purposes is the priority and any national connection is secondary. He says: 'Monitoring is for Otterburn Park, first and foremost. If there is the opportunity to do a national matching of champions... then we can do that. That seems of future interest. First we have to establish local monitoring.

And Stephane Tanguay, also working in Quebec, agrees that the dual mandate of an emerging national network can be a challenge for presenting the concept to communities who may be hesitant to engage: 'The Canadian Community Monitoring Network seems to have a dual purpose. [The VSI CBM initiative] is a specific program to see how Community Based Monitoring can help local issues. In the background, [the project partners] hope a network can be established to provide data for CCMN and EMAN. But those can conflict. I can't get people to collect data for the sake of it. I'm trying to get Community Based Monitoring to work locally. If it becomes national, then that's a bonus.' So although one goal of CBM is to make monitoring demand-driven by public policy needs, it must balance (or give precedence to) the other goal of making monitoring community-driven by values, concerns and aspirations. A key point here is that the success of demand-driven community based monitoring is inextricably linked with meaningful citizen engagement.

A second crucial aspect of communication is data management and reporting. Although most communities have yet to develop a strategic internal communication plan, issues of data collection, analysis, storage and access have all been raised. Champions and partnerships can often enhance data management capacity. Potential mechanisms for reporting monitoring results include State of the Environment Reports or State of the Watershed Reports.

To make monitoring activities relevant, data interpretation needs to be reported back to the volunteers who collected it and to the wider community. A feedback mechanism that affirms the value of community efforts is considered crucial for maintaining interest and involvement. As Mark Johnson, working in Cape Breton, Nova Scotia, suggests, with any volunteer effort it is important to show that participation is valued. 'It keeps people motivated.'

Sharing local data with a national network for wider information sharing remains one of the greatest uncertainties for coordinators. They lack a clear sense of how local monitoring data will be shared, assessed or used. Processes of national data amalgamation, meta-analysis, and reporting of trends are still in question. These types of issues represent communication gaps for coordinators and comprehension gaps for communities. Without effective data management and reporting, both locally and nationally, the full value of CBM will continue to be questioned.

Finally, vertical communication between regional coordinators and the national management team and horizontal communication between regional coordinators themselves were identified as important to the success of the network. Half of the interviewees felt a strong

sense of network or support from the national level and wanted more responsive relationships and future opportunities to meet as a group. The CBM initiative Intranet site, developed for communication among coordinators, has been only marginally effective for its purpose.

Communication Strategy	❑ Establish program identity and information sources
	❑ Market CBM inside and outside the community
	❑ Manage data and information locally and nationally
	❑ Maintain vertical communication within network
	❑ Maintain horizontal communication between communities
	❑ Design feedback mechanisms for volunteer recognition

4.3.11 Ecological Monitoring

For the CBM initiative, ecological monitoring was the core area in which citizens were invited to engage. Coordinators were not expected to begin monitoring activities, unless they felt their community was ready within the first year. Some groups that were ready were deterred by the timing of the pilot year. It did not coincide with spring and summer – the most common seasons for monitoring.

For this component, existing monitoring was assessed (through reconnaissance and consultation), monitoring priorities were identified (sometimes through visioning), and appropriate protocols were identified. Across Canada, different communities identified different issues of concern, including for example, water quality, air quality and biodiversity. The following table lists communities and a selection of their respective monitoring interests.

Community	Key Monitoring Issues
Deline Fort Smith Inuvik	Uranium contamination; Oil & gas development impacts; Fish stocks; Caribou & muskox populations; Climate change; Community wellness (socio-economic)
Nanaimo Parksville-Qualicum Beach Port Alberni	Water quality monitoring; Photopoint stream bed monitoring; Seasonal bird counts; Shoreline monitoring; Reef monitoring Wildlife Tree programs; Fish counts; Amphibian counts; Wildflowers & plant inventory
Canmore Banff Harvey Heights	Water quality monitoring Invasive plant control Air quality (coal burning)
Black Diamond Turner Valley Okotoks	Water quality monitoring; Water quantity monitoring Residential pesticide use Watershed Management
Pincher Creek Peigan Nation	Tourism impacts; Erosion monitoring; Air quality (from gas flares); Water quality monitoring; Native grass monitoring
Peterborough Lakefield Norwood	Water quality monitoring; Biodiversity monitoring; Air quality; Over 20 existing monitoring programs Watershed Management
Hamilton Glanbrook Flamborough	Air quality monitoring; Water quality monitoring; Toxic Spills Hotline; Stack Watch program; Over 20 existing monitoring programs; Watershed Management
Pointe Fortune Otterburn Park	Water quality; Sludge spreading; Residential pesticide use
Moncton	Water quality monitoring; Oil spill remediation
Saint John St. Andrews Bouctouche	Water quality monitoring; Eider duck populations; Harbour seal populations; Sea lettuce as indicator species Benthic macro invertebrates
Fredericton Canaan-Washadamoek	Water quality monitoring; Benthic macro invertebrates; Land management strategies; Watershed Management; Greenhouse gas emissions
Sydney – New Waterford Glace Bay Northside	Tar pond remediation; Fresh water mussel monitoring; Migratory bird monitoring; Herpetofaunal atlas project

Selected Monitoring Interests of Communities participating in the CBM initiative.

As indicated by the chart above, the majority of communities participating in the CBM initiative have existing monitoring activities (at both governmental, regional and community levels) that can be linked and built upon, while a few communities that are new to monitoring have smaller initiatives planned. In the town of Black Diamond, Alberta, a community river clean-up led to interest in the River Watch program for schools to monitor water quality (BOX 13).

> *Box 13: Three times in 2002, Grade 10 and 11 Foothills Composite High School and Oilfields High School students in the Towns of Black Diamond, Turner Valley and Okotoks, Alberta conducted field monitoring with RiverWatch and the regional coordinator, Maureen Lynch, on the Sheep River. Students measured physical, biological and chemical parameters in the river. These included: temperature, velocity, turbidity, benthic samplic for macro invertebrates, dissolved oxygen, pH, etc. Data collected by the students will be uploaded to the RiverWatch[1] Community Monitoring Database.*

A major opportunity for CBM lies with academic institutions. Not only are schools ideal forums for educating people about the values of ecosystem monitoring, they are also institutions that are likely to exist for years. Most coordinators recognize the roles that high schools, colleges and universities can play in their regions. Mark Johnson points out the value of using schools in Cape Breton, not only for student monitoring and education, but also for consistency: 'When we talk about long-term monitoring efforts having a base, say where you are monitoring flowering times for instance, you want the same place over the yearly period without changing it around. So a school is a great place to do that.'

Meredith Carter agrees that she can match monitoring to the curriculum in the Peterborough area and rationalize student participation through educational benefits while enhancing monitoring. For example, forest plots can be selected on school property making it convenient and inexpensive for students to participate and making the monitoring site annually consistent.

However valuable institutionalized monitoring might be, this model may not adequately accommodate the enthusiasm of volunteers at the outset to engage in 'hands-on' fieldwork and data collection. Rather than initiating extensive planning processes that take long-term commitment themselves, coordinators are facilitating ecological monitoring according to local priorities as a way to engage people first, and then build towards collaborating with decision-makers second. Meredith sees the importance of taking action on people's interests: 'In terms of sustaining the interest, I think if people feel that their time is valuable and that it's making a difference right away...I don't think I'll have any problem. But...it's a process. How do we do something important right now and not get bogged down in the planning?'

From the literature and from the interviews, it is clear that citizen involvement with CBM must be meaningful for it to be sustained. Local knowledge should be respected and balanced with other views. Most coordinators expressed an awareness of local knowledge held by long-term residents of an area, or the expertise of various CBM members.

Often the people who inhabit an area have anecdotal historical evidence of environmental change. They are also the ones that make direct and daily observations of their environment. In southern Alberta, Joleen Timko reports that many people are concerned about the effects of gas flares on their health based on their observation of problems in cattle. Similarly, in southern Ontario, where industrial activity goes on in the city of Hamilton, local residents can identify a potential problem but have no way to establish its greater scientific significance (Box 14).

BOX 14: As Brian McHattie of Environment Hamilton says: 'The people who live there hang their laundry out and they can see there's a problem... or there is black guck on their lawn chairs. But they don't have a sense of what that means. So with the Lichen Watch and the air sampler from McMaster University, we're going to do that and show them how to do it themselves.' In response to citizen concerns, Environment Hamilton developed StackWatch to monitor industrial air contaminants and particulate. In the past, it has been difficult to identify the source and type of pollution accurately, so a wide-angle map identifies each stack by name. The map has been distributed to citizens, naturalists and boaters around Hamilton Harbour, and with LichenWatch will provide a means of monitoring and reporting air quality changes.

Community Based Monitoring will generate new knowledge about existing problems and help to identify emergent issues. For involvement to be meaningful and for participation to evolve over time, training and equipment need to be provided to volunteers so that they can build new skills and hopefully make those skills transferable to others. To be successful in the pilot year, several coordinators started small by choosing simple protocols that did not require a high level of commitment, technical training or expensive equipment.

Ecological Monitoring	❑ Build on existing monitoring; avoid duplication ❑ Institutionalize monitoring in organizations and schools ❑ Engage participants in meaningful activities ❑ Identify policy and planning needs to guide CBM

4.3.12 Achieving Influence

During the interviews, most coordinators were able to identify potential leverage points between monitoring and local policies and management strategies. Many cited visioning processes and sustainability indicators as opportunities to integrate monitoring results. Several coordinators commented on the strong value of having the support of decision-makers. Some coordinators feel that their local decision-makers see the value of CBM and would be open to greater involvement. Others have identified partnerships that could potentially lead to a similar kind of support.

Securing the support of decision-makers for CBM is particularly important at the outset of the program, in order to ensure continued support for ecological monitoring. Some coordinators only worked with those willing to engage and others gave open invitations to leaders to participate in hands-on community events. Some found that they could learn the best approach to influence decision-makers from bureaucrats who had significant experience working within the system. Others noted that establishing a relationship with staff became a form of influence itself (Box 15).

BOX 15: In consultation with Environment Hamilton, city staff recommended to Hamilton City Council that staff in the Operations and Environment Department make community-based ecological monitoring information available to the Municipality and various City projects through the existing VISION 2020 Annual Sustainable Community Indicators Report Program. For years, members now with the non-profit group Environment Hamilton have worked closely with city planners and other staff on achieving influence.

According to coordinators, the most successful approaches for interacting or influencing decision-makers for sustainability are as follows:

- Meetings with staff and management (bureaucrats)
- Meetings with elected members of council
- Meetings with influential public groups
- Invoking political interests or an issue of common concern
- Selling the benefits of community based monitoring for decision-making
- Establishing credibility as a community based initiative
- Showing progress, commitment and open communication
- Being approachable and visible in the community

It is also important to be aware that conventional decision-making models frequently deny the opportunity for genuine participation. Where this is the case, community groups appear to be highly adaptable and highly opportunistic. In other words, they can often adapt well to change or take advantage of new opportunities. Given the behaviour of some institutions, groups may adapt their strategy of influence depending on the support they receive from government, for example. They may use other points of leverage such as legal action through the courts or those that are less formal, such as the media. Achieving an open forum where issues can be deliberated upon openly is ideal. As soon as issues become highly contentious though, groups may need to strategically reposition themselves. As a research and activist organization, Environment Hamilton has used multiple strategies to ensure that their issues stay on local political agendas. Their tools and tactics range from education campaigns, media coverage, and lawsuits, to personal meetings with city staff, presentations of scientific evidence, and the credibility of their research.

As outlined in the capacity building discussion, the values of monitoring must be well understood for volunteers to meaningfully engage, yet the values of CBM must also be understood by policy-makers for monitoring to be legitimized and fully utilized. As Marise, in Moncton, New Brunswick, suggests: 'People are interested in this project to prove to policy makers that there are gaps in what we know and what we need to know. And I think policy makers see this as an opportunity.'

Unfortunately, the ability of community groups to actually influence decision-making institutions and agendas is often quite limited. Deliberative processes that are genuinely participatory must encourage public influence of decisions. Where local government has actively opposed the role of citizens in environmental monitoring, opportunities for achieving influence are typically confrontational, not collaborative.

Capacity building must occur within institutions and governance structures in order to inform CBM of policy needs and in turn, to integrate ecological information into decisions. In many cases this research suggests that municipalities and other agencies, for example, lack the capacity and experience to identify and articulate their information needs explicitly, and to

then integrate new information in an adaptive approach. They may be limited by legal, jurisdictional, public opinion, or resource constraints, among others.

For effective delivery of information and adaptive management, influence must be achieved in at least four key ways:

1. Decision-makers must be able to identify their information needs (with help from staff, planners, constituents, research organizations, upper government, etc.)
2. Decision-makers must articulate their planning and management needs explicitly;
3. Strategies for achieving influence need to be pursued by local groups; and,
4. Decision-makers must integrate new ecological information into their management frameworks.

Strategies for achieving influence have ranged from formal collaborative and institutional approaches to less formal processes conducted at the grassroots. Community events, public education campaigns and direct action can also achieve influence. In the Canaan-Washademoak area of New Brunswick, where there is a perceived lack of environmental management agencies and a gap in policy, community members created a multi-stakeholder forum in which to develop a watershed management plan. Without access to, or very much interest in, formal decision-making, they circumvented traditional routes, taking direct action to make their own decisions about their environment. It is expected that this grassroots approach will generate greater credibility and compliance in the community than management that is imposed from above, top-down.

Achieving Influence	❑ Nurture relationships, build credibility and trust ❑ Build on Governance Analysis to identify strategies ❑ Invite support of decision-makers ❑ Create opportunities to collaborate with decision-makers ❑ Build capacity of decision makers and institutions ❑ Use media to enhance program profile ❑ Work with partners, bureaucrats and other 'insiders'

4.3.13 Fundraising

Throughout Community Based Monitoring literature, and across the communities in this Canadian case study, the challenge of funding is a common theme. Although CBM groups will need to secure funding to continue coordination of monitoring, communication and political influence, most coordinators have not been able to accommodate the task of fundraising in addition to the range of other activities with which they have been involved.

However, some have begun to identify funding opportunities and a few have been secured. Many communities have great amounts of in-kind support available including: local expertise and training, monitoring equipment, data management facilities and staff, and a range of other support such as office space and laboratories. Arguably, the largest support for monitoring is the dedication of volunteer time and energy. Measurement of in-kind, including

volunteer hours, is important information for leveraging funding and for community recognition of volunteers. Nevertheless, multi-strategy fundraising (private/public, short-term/long-term) remains a significant challenge for the continuance and success of CBM.

In order to become sustainable, many coordinators commented that minimal funding is needed to maintain basic coordination and communication for CBM. With partnerships, champions and volunteers, many communities have the capacity to sustain engagement with monitoring but require some core funds for program maintenance. Indeed, minimizing program expenses while retaining a high quality experience for participants may provide one strategy for sustainable funding.

Not only is the amount of funding an issue, but also the duration of funds is of importance. Coordinators affiliated with existing organizations articulated some of the challenges with current funding regimes to the non-profit sector. Short-term grants along with their administrative demands can deplete capacity and damage trusting relationships in the community when programs end. Multi-year funding is needed, in order to better plan, build capacity, train staff and provide continuity.

Fundraising	❑ Secure multi-year funding opportunities
	❑ Appeal for in-kind support
	❑ Measure in-kind support including volunteer hours
	❑ Use a multi-strategy fundraising approach
	❑ Minimize program costs to sustain monitoring efforts

4.3.14 Project Management

Regional project management occurred on two levels during the pilot. First, coordinators developed work plans to guide them through the year, adapted them according to local circumstances and interests, and communicated progress on a quarterly basis. Second, work planning for CBM groups happened to a limited extent, primarily due to the need for more than a one-year establishment period and the ongoing development and creation of organizational structures.

Project Management	❑ Develop work plans for Community Based Monitoring
	❑ Communicate progress and new developments
	❑ Evaluate progress and celebrate success
	❑ Assess changing capacity needs, partnerships, influence

4.4 Observations

Before introducing the enhanced framework for CBM based on the analysis presented above, this section outlines several key observations from the CBM initiative evaluative research. First, community comparisons are made including similarities and differences in community contexts, in regional coordinators' approaches, and in the challenges to CBM. Second,

several observations are made about a government-community interface in terms of how an agency such as Environment Canada could 'do business' with CBM communities.

4.4.1 Community Comparisons

Although the selection of communities for this VSI project was based on the criterion of diverse representation (see section 2.1), one of the most interesting features of the evaluation process was the extent to which patterns emerged between communities. Comparisons and contrasts were continually being made and adjusted based on new information and the evolution of the CBM initiative. To summarize the general similarities and differences between communities and their approaches, several tables are presented.

First, the general similarities and differences between the communities are striking. The diverse range of communities is evident, yet overall the communities engaging in CBM activities appeared to have similar motivations and needs, in terms of capacity (communication, protocols and training). These observations strongly show that community capacity must be built for effective CBM. The left column shows some general similarities between the CBM initiative communities studied. The right column lists a range of differences that emerged through research, rather than at the outset of the project or during the community selection process (section 2.1). Many of these features would have been difficult to ascertain prior to hiring regional coordinators. Clearly, this is not intended to be an exhaustive list of variables; however, it does provide an indication of some of the stronger points of comparison and contrast. Further research would be required to identify the most influential variables for different contexts and goals.

General Similarities Between CBM Communities	General Differences Between CBM Communities
1. Volunteer motivations 2. Capacity needs 3. Communication needs 4. Protocol needs 5. Training needs	Institutional affiliation of coordinators Coordinators as 'insiders' or 'outsiders' Existing capacity in communities Existing CBM in the region Support of decision-makers Environmental values and vision Commitment of champions and volunteers Availability of funding Inciting issue or common concern History of stakeholder conflict Competing issues (e.g., unemployment)

Second, despite the high level of diversity among communities, the regional coordinators adopted surprisingly similar approaches. While each of them strived to make their approach appropriate to local context and adaptive to change, the techniques employed during the CBM initiative were largely shared across Canada:

1. Facilitation
2. Networking
3. Reconnaissance
4. Building trust
5. Starting small

6. Being adaptive to change
7. Capacity building
8. Identifying local priorities
9. Respecting local visions
10. Train the Trainer model

11. Seeking in-kind support   12. Creation of partnerships

The notable exception to these shared techniques was how formal or informal they were. The analysis shows a strong pattern regarding formality. That is to say, many of the approaches used by coordinators lie on a continuum of more formal to less formal, depending on whether:

- Coordinators had the capacity to do their job
- Coordinators had existing contacts and partnerships
- Communities were large or small
- Communities had been involved in monitoring before
- Communities understood the value of CBM
- Communities shared concerns and had the capacity to engage
- Decision makers were willing to engage
- Decision makers had the capacity to articulate information needs

Formal approaches were typically adopted by larger communities, which already had a wide range of networks and existing monitoring programs. Working with interested groups and existing organizations, rather than appealing to the general public was the preferred tactic. Larger scale meetings were often held in larger populations and more formal visioning and roundtables were held. However, within the larger networks were often close working relationships developed over years that provided champions, leverage for influence and opportunities for collaboration.

By contrast, smaller communities tended to use less formal approaches such as public meetings, open houses and used techniques such as word of mouth and the local media. Sometimes formal visioning processes were viewed as inappropriate, such as in closely-kit communities, oral cultures, or those skeptical of an imposed top-down model. Often CBM goals were formulated through a less structured process of consensus. However, within small communities there can be a few powerful institutions or agendas, sometimes with a history of conflict. Local politics can affect the success of bottom-up processes to a strong degree.

In most cases a combination of bottom-up expertise was combined with top-down expertise, inside resources with outside resources. The combined approach, reflecting participatory community development – where community leaders and members are both actively involved, is probably preferable to leadership from only one source. Unfortunately, specific variables or criteria for which approaches are most appropriate within large and small communities could not be identified within the limitations of a one-year CBM implementation experiment. Again, further research in this area would be required.

Examples of approaches ranging from more formal to less formal are listed below.

More Formal Approaches	Less Formal Approaches
Top-down consultation	Bottom-up consultation
Governance analysis surveys	Having coffee, meeting one on one
Targetted approach to engaging groups	Wide appeal for participation
Meetings and community forums	Open houses and hands-on activities

Visioning process	Informal articulation of goals
Formal organizational structures	Loose networks with fluid participation
Large scale round tables	Small scale 'kitchen table' model

Third, there appeared to be some common challenges faced across the CBM initiative communities and by their regional coordinators. While some of these challenges can be explained by the limitations imposed by a single year project, most of them likely relate to a lack of broader social, technical and coordination capacity. In addition, lack of political will and resources – such as funding – can be attributed to some of the challenges listed below.

Common Challenges Faced by CBM Communities	Potential Explanations for the Challenges
1. Governance analysis	Lack of time
2. Inventory of monitoring	Lack of information
3. Organizational structure formation	Lack of training
4. Data management systems	Complexity and uncertainty
5. Communication mechanisms	Volunteer burn-out
6. Long-term commitment of volunteers	Lack of political will
7. Standardized protocols that meet local needs	Lack of resources
8. Identifying decision-makers' needs	Lack of funding
9. Achieving political influence	Lack of capacity (expertise,
10. Uncertain government commitment	staff, time, money, etc.)

4.4.2 Effective Government - Community Interface

Regional coordinators were asked: "What would be the best ways for Environment Canada to 'do business' with community stakeholders to ensure their participation, both in the collection of monitoring information and its subsequent use?" They responded to this question implicitly throughout the interviews and explicitly in their answers. Observations from the research show that communities desire three elements of interaction with government:

1. Consultation and communication;
2. Resources and access to expertise; and,
3. Commitment to enhance the continuity of community engagement.

Each of the elements for an effective government-community interface is listed below (from the perspective of regional coordinators working with communities).

Consultation & Communication	Resources & Expertise	Commitment for Continuity
Build relationships	National coordination	Continuity of coordination
Use existing organizations	Tangible benefits	
Be respectful of existing work	Simple protocols	Long-term commitment
Hold 'real' public	Accessible data	

consultations Follow-up to consultation Outline goals clearly Outline benefits to community Have one point of contact User-friendly system (web) Avoid use of jargon	Accessible website Support person or staff Training manuals, leaders Data management system Funding support	Continue programs started Have a permanent presence Make data into meaningful information

4.5 Factors for Success

In addition to the observations made above, the evaluation identified a series of factors for success. The factors emerged from analysis of the primary interviews and were validated by testing them again in the secondary interviews. Then, the factors for success from the regional coordinators' perspective were combined with factors for success from a national perspective. Again, despite the high level of diversity and different approaches employed in the communities, the factors for success were strongly shared.

Factors for Success

1. Approaches to engaging the community are context specific.
   - Approaches are appropriate to local context and adaptable.
   - The ongoing cycle of community mapping, participation assessment, capacity building and information delivery activities and outcomes is continued.

2. Information delivery mechanisms are established.
   - Information needs are identified and communicated.
   - Community based monitoring programs are demand-driven.
   - Data is communicated as meaningful information.
   - New information is integrated into decisions and policies.

3. The experience must be meaningful for participants.
   - Common concerns are acknowledged.
   - Local and traditional knowledge are respected.
   - Benefits of ecological monitoring are understood.
   - Adequate training and equipment for CBM are provided.
   - Monitoring results are communicated to the public.

4. Coordination is critical.
   - Communication, facilitation, negotiation & mediation skills are developed.
   - Volunteer groups & CBM participants are coordinated at a local scale.
   - Broader partnerships and networks among communities are maintained.

5. Partnerships in pursuit of sustainability are necessary.
   - Partnerships to maximize capacity and resources are developed.
   - Partnerships to address ecological issues at regional or landscape scales are developed.
   - Existing contacts in the community are linked together.
   - Existing environmental initiatives are built upon.

6. Collaborative approaches are implemented.
   - Forums for multi-stakeholder discussion are encouraged.
   - Community visioning to define common challenges and goals is conducted.
   - Influence is sought on government policies, public values, and industry practices.

7. Ongoing national support for a coordinated network is provided
   - Commitment to community initiatives is demonstrated.
   - Support in the forms of resources, expertise, and staff are provided.
   - Established networks and partnerships are maintained.

Research of the CBM initiative shows the importance of using a community-specific approach to Community Based Monitoring. It also outlines factors for success relevant to all parties involved including: community residents, decision-makers, local or regional coordinators, CBM champions and institutions, non-governmental organizations, industry partners, and government agencies.

Essentially, Community Based Monitoring can be most successful when it is locally appropriate and adaptive, it establishes information delivery mechanisms, provides meaningful opportunities to participants, is guided by strong coordination, builds collaborative partnerships in pursuit of sustainability, has broad influence and is supported nationally.

5.0 The Enhanced Conceptual Framework for Community Based Monitoring

This section presents a critique of the original conceptual framework, then principles for community based monitoring and finally, the enhanced conceptual framework, based on the evaluation of the framework as applied in 31 Canadian communities through the CBM initiative.

5.1 Critique of the Conceptual Framework

Overall, the original conceptual framework was found to provide important strategic direction for the implementation of Community Based Monitoring in the thirty-one communities studied. A major strength of the conceptual framework, based on the evaluation, is its generic applicability despite a high level of community diversity. Most of the emergent themes identified in the interviews could be subscribed to at least one of the original components, and frequently to multiple components.

Likewise, the evaluation shows the validity of each theoretical component as tested against the practical application of the framework in thirty-one communities. The CBM initiative experience similarly confirms the related literature and case studies that shaped the framework.

Conceptualized as a two-phase implementation process (establishment and operationalization), the framework's structure was simple and clear. By noting the function of the framework – a guide, not a recipe for implementation – its users felt free to utilize the components that were most appropriate and ignore those that were not. As the framework stated: 'The tasks in each phase are not meant to be necessarily undertaken in sequence and certain communities with existing capacity may choose to skip certain tasks' (Whitelaw, 2002).

However, the evaluation also reveals several limitations of the original framework:

(i)   Community and ecological complexity was underestimated in the conceptual framework. Explicit emphasis should be given to the need for context-specific application of the framework. And as the original version correctly implies, the components represent a suite of tools to choose from: they are neither a requirement for success nor are they the only means to success.

(ii)   Components within the framework are defined too narrowly, and fail to convey the wide range of possible interpretations. The use of jargon and unfamiliar terms created a barrier for some users.

(iii)   The framework does not adequately demonstrate the inter-relationships between the components and the extent to which they reinforce one

another. At times the interfaces between components seemed to play a more important role than the individual components themselves (e.g., consultation combined with partnership development; membership assessment as a sub-set of capacity building; governance analysis as an extension of reconnaissance).

(iv)   Conceptualization of the framework as two distinct phases implies false linearity, rather than communicating the complex iterative nature and discursive process of implementing community based monitoring (CBM).

In summary, any conceptual framework for CBM must convey a central paradox: On one hand, diverse community contexts will dictate different approaches to how CBM is implemented; on the other, strong similarities emerge across CBM experiences – the main factors for success actually converge (section 4.5).

5.2 Principles for Community Based Monitoring

Based on the previous evaluation and critique of the original framework, this section presents enhancement to the framework for guiding Community Based Monitoring. The enhancements are informed by two main sources: the original model and its related research and the evaluative research presented in this report. The core principles for how to approach Community Based Monitoring are:

i. The approach must meet the challenge of diversity with versatility: appropriate to community context, respectful of local cultures, and represent an attempt to find 'best practices.'

ii. The approach must be iterative in nature: dynamic interaction between phases, goals and outcomes (in an ongoing cycle); synergistic activities that build capacity at all stages of CBM.

iii. The approach must be adaptive to change, flexible and opportunistic. It should continually incorporate new information, assessing capacity needs and fulfilling them to build social capital.

5.3 An Enhanced Conceptual Framework for Community Based Monitoring

Results of the evaluation suggest that since communities are unique, any approach to community based monitoring should be appropriate to local context, part of an on-going cycle and flexible to change. In other words, CBM needs to be versatile, iterative and adaptive. Given these emergent characteristics, this section introduces the enhanced framework for Community Based Monitoring that encompasses four dynamic phases: community mapping, participation assessment, capacity building, and information delivery

(Figure 3). The original two-phase conceptual framework is dissolved into the enhanced framework, yet all its components are transplanted into the new, as seen in Figure 4.

Community Mapping

Gathering information about the community helps to create knowledge to design CBM that is unique to the community and its values, vision and interests. It provides the opportunity for decision makers to describe their information needs and the chance to maximize collaboration between partners.

Goals:
- Assess community readiness & concerns
- Identify existing groups & activities
- Establish trust, build contact network
- Conduct consultation and outreach
- Inventory existing monitoring programs

Participation Assessment

Understanding the groups and people involved in CBM generates knowledge about how to engage them, use their skills and meet their needs. Participation Assessment helps find the best approaches for building capacity.

Goals:
- Assess public understanding of CBM
- Identify participants' motivations and expectations
- Understand membership skills
- Assess capacity needs & training needs
- Identify champions and leadership roles
- Engage decision-makers

Capacity Building

Enhancing the community's ability to carry out monitoring requires capacity in the form of resources and skills – both social and technical. Good coordination, training and information delivery mechanisms are essential. For example, capacity building enhances social capital, resources, technological access, knowledge & skill development.

Goals:
- Create or expand partnerships, networks
- Develop organizational structures
- Use good communication mechanisms
- Select appropriate monitoring protocols
- Make data management operational

INFORMATION DELIVERY

Communication flows through all aspects of CBM. Educating people about monitoring, identifying local priorities and reporting back the results rely on effective communication. When information needs are identified, monitoring becomes demand-driven, which informs the development of more effective tools and solutions for local environmental issues. The decision makers then need to feed this knowledge and skill into appropriate local choices that are adaptive.

Goals:
- Articulate information needs
- Translate data into meaningful information
- Provide and integrate new information into decisions
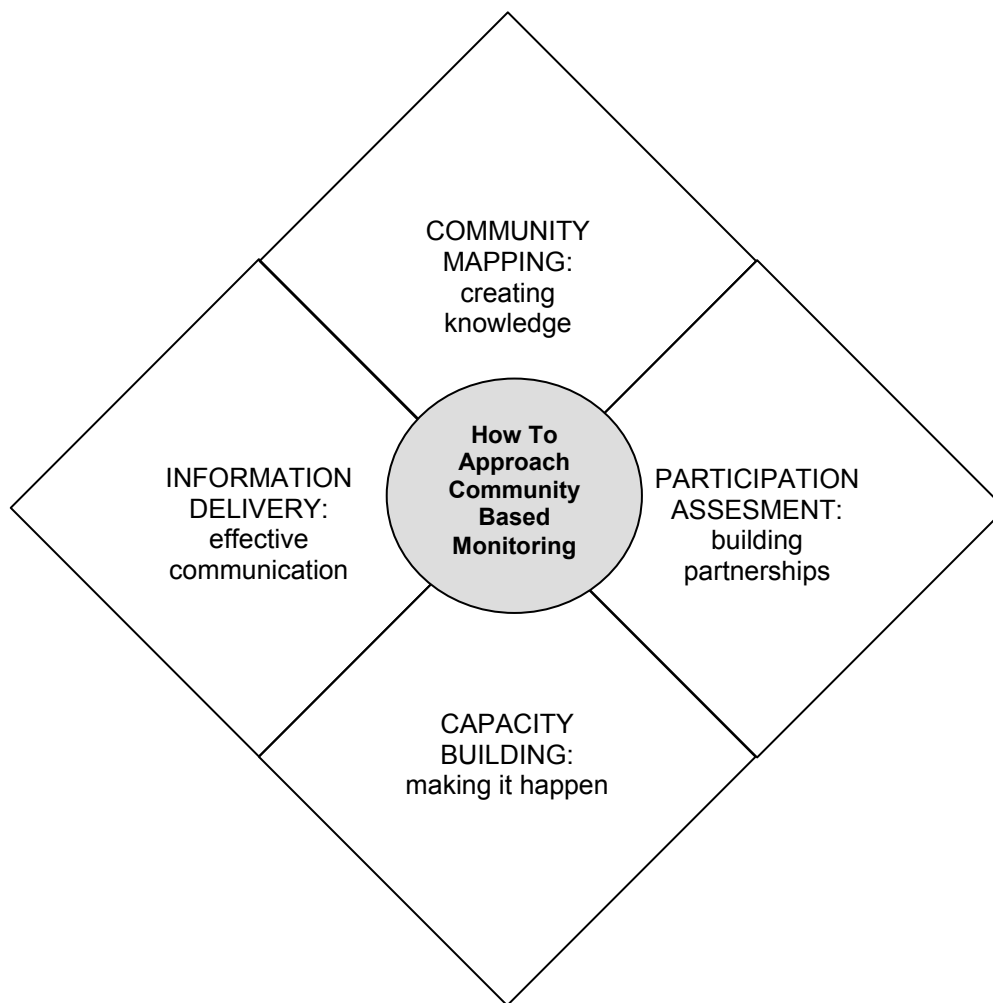- Institutionalize ecological monitoring

Figure 3. The enhanced conceptual framework for Community Based Monitoring (Pollock, 2003, enhanced from Whitelaw, 2002).

```
                    COMMUNITY
                     MAPPING

                   Reconnaissance
                 Governance Analysis
                  Communication
                     Visioning

  INFORMATION                          PARTICIPATION
   DELIVERY                             ASSESSMENT

 Ecological Monitoring                Governance Analysis
 Project Management                  Membership Assessment
 Achieving Influence                 Consultation & Outreach
   Communication                     Champion Identification
                                        Communication

                     CAPACITY
                     BUILDING

                Partnership Development
                Organizational Structure
                  Capacity Building
                   Communication
                     Fundraising
```
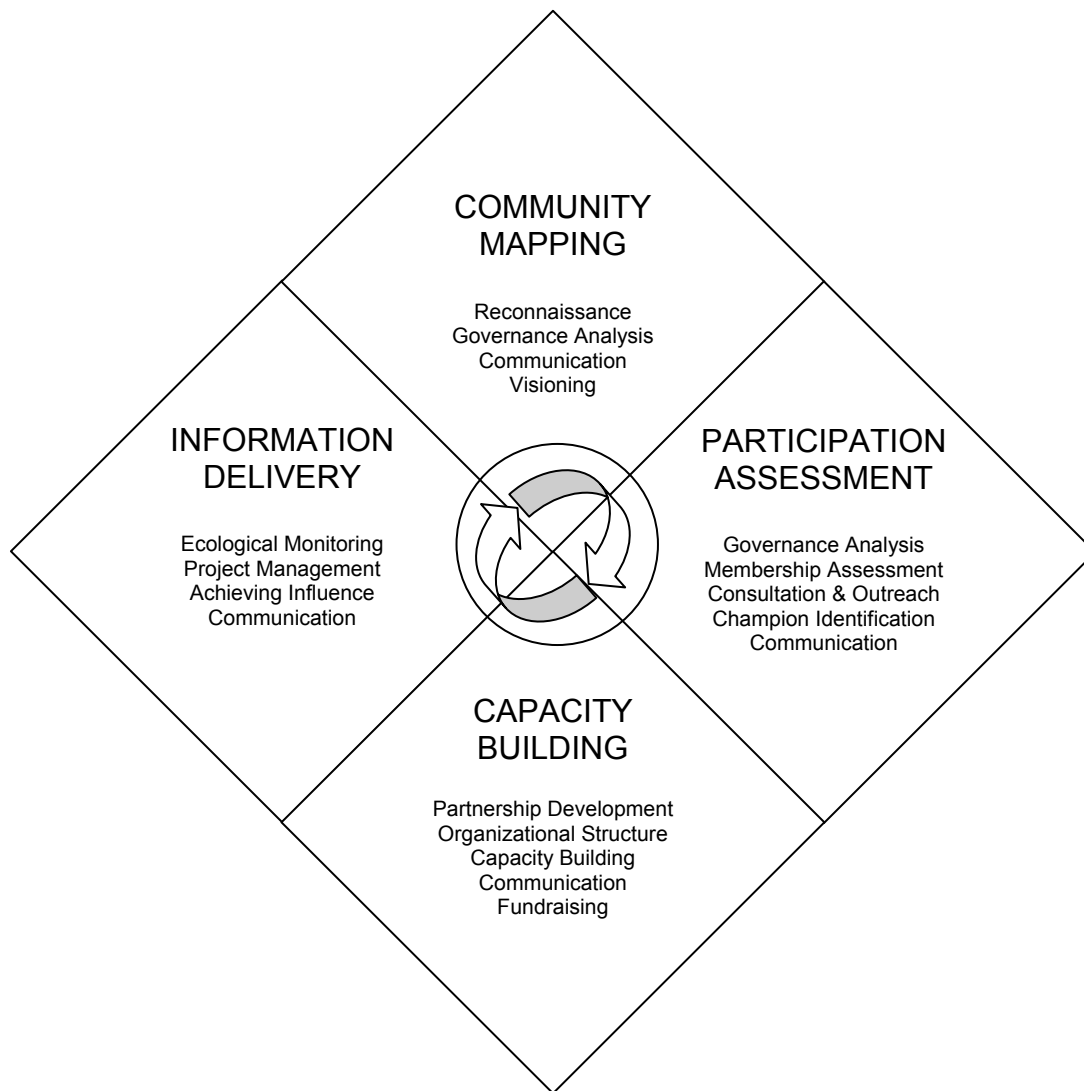
Figure 4: Integration of original framework components (Pollock, 2003 as enhanced from Whitelaw, 2002).

The enhanced conceptual framework incorporates the strengths of the original conceptual framework and resolves some of its limitations. It combines theoretical principles with practical elements. It can be characterized by its versatile, iterative, and adaptive nature. It can be deconstructed into its various components and goals (e.g., communication, capacity building) while maintaining an interconnected whole - four dynamic and iterative phases.

Note how the activities in each phase relate to the others. When the enhanced framework is applied, each of the components plays an active role, repeating as needed to achieve various goals. For example, community mapping helps to identify a potential champion, participation assessment confirms the role of that champion, and capacity building is enhanced by their involvement. The champion organization often has a strong role to play in information delivery.

The enhanced framework for Community Based Monitoring exhibits dynamic behaviour. Each area of the framework generates outcomes that have an effect on the other areas, illustrating how the components mutually reinforce one another and how a ripple effect can be created. Multiple goals can be met simultaneously; success in one area may affect the success in another. The enhanced framework also represents a complex set of concepts, goals and techniques for achieving those goals. Again, the techniques make extensive use of the original components (such as governance analysis, visioning, consultation and outreach).

Most importantly, different community contexts will dictate different goals, techniques and approaches to implementation of CBM. Although two communities might share similar goals, for example, they will likely employ different means to a similar end. Success is context-dependent and outcomes will vary.

While it must be emphasized that there is no specific 'starting point' for how to approach CBM, most of the research suggests that a cycle of community mapping, participation assessment, capacity building and information delivery are most common, with each of the areas being revisited in an iterative and adaptive fashion.

For example, information gathered in the community mapping phase informs each of the other areas, participation assessment builds on mapping activities to deepen knowledge and design context-specific approaches, capacity building enhances the outcomes of the other areas and information delivery underpins each phase and contributes to meaningful outcomes in the way that monitoring information is used. This is illustrated further in section 5.5, *Applying the Enhanced Conceptual Framework on the Ground.*

5. 4 Tool Box for Community Based Monitoring

	TOOL BOX	QUESTIONS TO ASK
Community Mapping	**Information Gathering** to understand local context. **Governance Analysis** of the main groups within the community that influence environmental planning, management & reporting. **Decision Making Support** that provides opportunities for the community to identify their information needs.	What kind of information is needed for making decisions? What kind of monitoring is going on already? Who are the key groups and networks that could be involved? What are the best ways to engage each different group?
Participation Assessment	**Consultation & Outreach** activities that seek interested participants. **Champion Identification** of those individuals or groups driving CBM. **Citizen Engagement** of various stakeholders and partners. **Visioning** builds on information needs to define a desired future.	Are the values of monitoring commonly understood? What are participants' motivations and expectations? What kinds of skills and expertise are available locally? What resources, training and equipment are needed? Who are the potential champions? What are common community values and goals?
Capacity Building	**Partnerships** maximize capacity by expanding the pool of resources and expertise. **Organizational Structure** may help to facilitate CBM activities. **Communication** is essential at all levels and stages of CBM. **Resource Support** from in-kind and financial sources are needed to maintain coordination and communication systems.	What partnerships can be created or expanded? What data management systems are required? What communication mechanisms are needed to deliver ecological information? What sources of in-kind and financial support are available?
Information Delivery	**Ecological Monitoring** defined and driven by community interests and decision-makers information needs. **Information Reporting** that changes raw data into meaningful information for decision-making. **Achieving Influence** on government policies, public values and industry practices.	Is monitoring data turned into useful information? How should the results of monitoring be communicated? In what ways can decision makers use the new information? How can monitoring be built into the community for the future?

5.5 Applying the Enhanced Conceptual Framework on the Ground

How can the enhanced conceptual framework for Community Based Monitoring be applied? The following story shows how the framework can be used to guide CBM on the ground. It describes one coordinator's approach to implementing CBM in three Canadian communities. While the four components are separated for the sake of a clear description, it should be understood that most of these activities developed somewhat simultaneously, not sequentially.

The success story of Okotoks, Black Diamond and Turner Valley, Alberta, was based on two interviews with Maureen Lynch (CBM regional coordinator), an interview with Wendy Aupers (Communications Officer for Okotoks), participation at Black Diamond's Parade Day (June, 2002) and the opportunity to participate in a special community forum involving town councilors, managers and staff from the three communities (October, 2002).

All of the other communities involved in the CBM initiative could contribute similar lessons from the ground, and many of their examples have been integrated throughout the previous analysis (section 4.0).

Applied Community Mapping

According to Maureen Lynch, regional coordinator for Okotoks,[7] Black Diamond and Turner Valley, Alberta, the timing of the CBM initiative was an important factor for success. "They were ready to engage." The communities expressed interest in CBM and saw the opportunity to work together within the same watershed.

Existing monitoring, groups and potential partners were all assessed as a part of reconnaissance and informal governance analysis. Both the municipality and the health authority were involved in monitoring. A Geographic Information System (GIS) had been developed for the town of Okotoks which could incorporate new monitoring data. The Sheep River Valley Preservation Society and the Healthy Okotoks Coalition were involved in a range of issues related to the environment. The Earthwatch Institute Oral History of Skagit River project introduced active community mapping. The Bow River Basin Council,[8] a multi-stakeholder group that promotes stewardship-based management was a strong potential partner.

In addition, Maureen learned about several opportunities where monitoring could be promoted. The Tri-Community River Clean Up helped build a link between the three communities and engaged more than 150 volunteers and local decision-makers. Other

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[7] To learn about CBM in Alberta, visit www.okotoks.ab.ca and www.blackdiamond.ab.ca

[8] For more information on the Bow River Basin Council, visit www.brbc.ab.ca

annual events where the concept of CBM could be introduced in a non-threatening way included the Arts Festival and Parade Day.

For consultation and outreach Maureen used the philosophy: "Go where you're invited" and "do it on their terms." Her approach was appropriate for the community and included presentations to council, use of local media, word of mouth, and actively participating in community life.

Applied Participation Assessment

Based on an informal participation assessment, Maureen suggested that in Black Diamond, Turner Valley and Okotoks, people are motivated to participate in monitoring programs by concern for their environment. Most importantly, they need to feel that their contributions are valued and make a difference. Her assessment also found a need for education and awareness about monitoring. Public understanding of monitoring is sometimes lacking and is needed for people to buy-in. They want to know: "Why are we doing this? What are we monitoring?"

To engage decision-makers in CBM, Maureen invited them to participate in hands-on activities, build relationships with one another, link their common interests, and maintain open communication, using Maureen as their facilitator and link. Fairly quickly, all three councils and the Bow River Basin Council were identified as champions. Other capacity needs were also identified at this stage, for example: improved communication in the region, facilitation skills for meetings, protocol training, and monitoring equipment. Articulating information needs of decision-makers was commonly seen as an important challenge to address.

Applied Capacity Building

A number of partnerships helped to build the capacity of CBM in the area, including tri-community initiatives that received support from all three town councils. In addition, town council staff and managers provided strong support. Partnerships with the high schools (students, teachers and administrators) made water quality monitoring possible. And as a CBM champion, the Bow River Basin Council continued to play a crucial role.

For ecological monitoring with the schools, the 'River Watch' program built capacity by providing protocol training, equipment, and data analysis and storage.[9]

Communication mechanisms such as extensive media coverage, word of mouth, web sites, community information boards, and regular updates from the coordinator all enhanced public awareness and understanding of monitoring. For sample newspaper articles about CBM, visit http://www.westernwheel.com/020515/news-environmental.html and http://www.westernwheel.com/030108/news-environment.html.

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[9] For more information about the River Watch program, visit www.riverwatch.ab.ca

One marketing strategy that was used was the production of a tri-community logo for all partnership projects. In the past, social marketing survey techniques had been used, building communication capacity by contacting all residents (e.g., door to door visits). Social marketing is a potential tool for wider education about Community Based Monitoring.

With larger capacity, the town of Okotoks (population 12,000) can share resources and experience with smaller communities. For example, the vision for Sustainable Okotoks is an example of one way for other communities to recognize ecological limits and set goals for their future. Although visioning may not be appropriate for other communities, Sustainable Okotoks provides a good model for those that may be interested in a similar process.

Based on the participation assessment of capacity needs (above), facilitation training was offered to interested residents for use at future multi-stakeholder meetings and visioning sessions. "It doesn't always have to be a professional facilitating. They can lead themselves." Coordination capacity was needed to connect the common interests of the three communities. Maureen was adaptable and open to the unexpected. Like many coordinators, her opportunistic approach opened new possibilities for CBM. For example, with the support of high school principals, an opportunity for student community service could be partly directed toward monitoring efforts. Flexibility gave Maureen the ability to find the "best-practices" for community based monitoring to be integrated into her unique communities.

Applied Information Delivery

Over one million people share the Bow River Basin. In the tri-communities, people want to be informed. They share an identity that transcends political boundaries and many of them want to protect where they live. But prudent development requires information.

Articulating the information needs of decision-makers can be difficult, according to some of the town councillors. There is a need to identify specific problems and match them with specific solutions. Beyond the elected officials, a variety of administrative staff, managers and planners at the bureaucratic level must also buy-in to the need for monitoring. Maureen pointed out the strong support to CBM provided by town managers and other staff. Decision-makers in every capacity should appreciate the need for new knowledge to inform decisions – and that includes residents. Heightened awareness through education is an important step for everyone in the community.

Sustainable Okotoks represents another big step toward local sustainability. Their vision for sustainability identifies community values and ecological limits of the watershed, resulting in several management plans for protected areas, water, and renewable energy. The strategy caps population growth at 30,000 and matches municipal infrastructure to this size. For details visit: http://www.town.okotoks.ab.ca/sustainable_okotoks.html.

Community Based Monitoring provides information that can build knowledge. For that reason, CBM represents an important decision support tool – it has the potential to provide information, and to be guided by community values.

Summary

Based on this example in Alberta, the enhanced conceptual framework for Community Based Monitoring can be adapted to meet specific community needs and interests. The coordination approach used in the tri-communities shows how each component in the framework is connected. For example, the component of champion identification is part of each of the four phases:

- Community mapping helps to identify potential champions (e.g., the town councils and the Bow River Basin Council);
- Participation assessment confirms the role of champions;
- Capacity building is enhanced by their involvement; and,
- Information delivery is encouraged by champion involvement.

A similar exercise could illustrate the way other components, such as consultation and outreach, communications, or partnership development are woven throughout the ongoing process of CBM suggested in the enhanced framework.

6.0 Lessons Learned

Several lessons emerged from the Community Based Monitoring initiative. Some potential benefits and future challenges are first outlined below. Then a brief discussion of other lessons relating to CBM: organizational structures, community complexity, collaborative approaches, local governance, achieving influence, scale, public participation and social capital.

6.1 Benefits of Community Based Monitoring

The following list illustrates the wide range of benefits available from Community Based Monitoring activities. Many of these potential benefits were identified within the thirty-one pilot communities, and some, such as collaboration, were beginning to be realized.

    i.   CBM brings people together from different groups, sectors, and jurisdictions, to form partnerships. Through these partnerships, the community can identify common concerns and possible solutions through the collection, evaluation, and sharing of information.

    ii.   CBM networks often seek out meaningful collaboration between citizens and government, thereby improving public involvement in community decision-making.

    iii.   CBM can enhance local governance structures, by putting the creativity, skills, and resources of many different individuals and groups toward solving a problem.

    iv.   CBM allows communities to increase knowledge about their environment by generating locally relevant monitoring information. CBM brings to monitoring a unique understanding of the local situation and the needs of individual communities. Communities can then use this information to set their own limits on development and measure whether they are met.

    v.   The use of standardized monitoring methods across Canada will allow for the comparison and integration of information within landscapes and among communities.

    vi.   CBM gives local decision-makers the information and tools they need to make informed policy choices and management plans which are adaptive and responsive.

    vii.   CBM contributes toward building social capital in participating communities. Increased social capital improves the community capacity to deal with the many complex issues and choices associated with sustainability.

6.2 Future Challenges

While the coordinators were able to make considerable strides toward implementing CBM, some aspects of the process continue to prove challenging in several communities. These include:

    i.   Achieving the long-term commitment of stakeholders to CBM.

ii.   Identification of decision-makers' information needs and making the connection to local decision-making structures in order to achieve influence.
iii.   Integration of all information gathered for a comprehensive assessment of local ecological sustainability.
iv.   Finding improved systems for managing data.
v.   Gaining the long-term commitment of government for scientific support, coordination, advice and assistance.
vi.   The absence of standardized monitoring methods to respond to all local priorities such as soil toxicity, invasive species and the use of pesticides.
vii.   The identification of ecological thresholds or breaking points.

Several CCMN coordinators will continue to work toward identifying solutions to these challenges with their community and the support of the network through the iterative process of CBM.

6.3 Organizational structures

The CBM initiative has demonstrated that government (EMAN CO) support for CBM has been effective and extremely efficient. Top-down support has included financial resources (VSI funding) providing for the hiring of two national coordinators and 12 regional coordinators. Funding for staffing at this level has allowed for the testing of the CBM conceptual framework and its enhancement, and for the establishment of CBM in thirty communities.

The resources provided demonstrate that community coordination provides measurable benefits to the advancement of CBM (networking, partnership development, fundraising, skills training etc.). The demonstrated importance of national coordination in the CBM initiative also suggests that long-term Canadian Community Monitoring Network survival and growth will not be possible without ongoing national support. Sharing experiences nationally, data management, protocol development, website maintenance and capacity building (for communities and coordinators) are all areas that will suffer, if not cease to be provided, without national coordination.

A second interesting lesson from the initiative was that coordinators who had an institutional affiliation (or belonged to existing non-governmental organizations) experienced a high level of success in making progress on CBM (section 4.3.2). Their connections to the community and ability to tap into existing organizational structures greatly enhanced their abilities to tackle their tasks immediately, where it typically took coordinators from outside communities longer to launch their activities. This has implications for the future of the Canadian Community Monitoring Network. One focus could be on recruiting existing organizations interested in, or already undertaking, CBM. The existing capacity of such organizations would be expected to enhance the overall success of CBM and the CCMN.

The EMAN CO-CNF partnership worked well for a number of reasons:

- Respect for the EMAN CO and CNF partnership helped community coordinators with developing credibility at the outset of the project.

- The skill set each organization brought to the project (EMAN CO provided the technical support in terms of monitoring protocols and information management while the CNF administered the project) led to complementary support for the project.

- The role of Government as a support agent rather than leader appears to have been beneficial. Communities soon realized that the regional coordinators were in charge and only received advice and resources from the national level, rather than on-the-ground direction.

6.4 Community complexity

The CBM conceptual framework developed at the outset of this initiative formed the basis for the efforts of the 12 regional coordinators (section 3.0). Although the framework as presented to the community coordinators indicated that the steps identified were not necessarily to be followed in a sequential manner and that coordinators need not carry out all the steps if their particular community had existing capacity, the results clearly suggest that community and ecological complexity was certainly underestimated in the original conceptual framework. CBM cannot follow a pre-packaged process.

The enhanced framework (section 5.0) shows that Community Based Monitoring must be appropriate to local context and adaptable at the local level. The enhanced model must be supported by a 'tool box' from which communities can select tools and techniques, so that CBM can be designed to address their unique needs. This does not reduce the importance of developing and testing standardized protocols. Many will opt to use standardized protocols if they match community interests, and this will lead to greater standardization of monitoring across the country.

6.5 Collaborative Approaches

Experience from the initiative indicates that the collaborative model has yielded the greatest results to date. Simply getting people together across established jurisdictions, social groups, sectors and neighbourhoods is a powerful beginning. Engaging diverse stakeholders, including decision-makers, helps to build trust, establish common concerns, and pursue CBM goals collaboratively (section 4.3.5). This is especially true where the CBM group establishes an open forum such as a round table or monitoring advisory committee and invites all interested parties to discuss valued ecosystem components, monitoring and related activities. These forums have the potential to open dialogue, where all parties participate as equals. Creativity, information sharing and innovative solution development appear to depend on:

- Establishment of open (transparent) forums where all parties interested in CBM can meet to discuss valued ecosystem components and from that comes monitoring priorities and related activities.

- Use of effective and trusted facilitators (and mediation where necessary)

The open forums should remain under the direction of the CBM group or network.

6.6 Local governance

Generally, the understanding of governance has evolved from "the act or process of governing" synonymous with 'government' to the broader involvement of civil society and the private sector in the development of policy and influence on decision making through networks and partnerships (Painter, 2000). The experiences through this initiative indicate that CBM certainly has the potential to contribute to this governance evolution through the development of new networks and partnerships in pursuit of sustainability. CBM is an activity that appears attractive to government, NGOs, and the private sector as an activity that is neutral, allows for discussion of issues in a usually non-confrontational arena and results in beneficial partnership activities.

In many cases open platforms in the form of round tables are established where all parties have equal roles in terms of developing CBM, implementing monitoring and evaluating information. Each sector brings to the table different strengths (e.g. government – monitoring expertise; civil society – community vision and volunteer time; private sector – funding). Potential long-term networks may enhance governance structures and can be brought to bear on difficult issues ranging from resource development issues, land use development issues, community development issues, as well as new issues that never have been thought about or discussed in the context of "community."

The development of new partnerships and networks can be attributed to:

- Comprehensive governance analysis prior to CBM initiation. A number of coordinators carried out social network analysis to do their governance analysis, while others accumulated a qualitative understanding of governance structures. Both approaches proved useful (section 4.3.4).

- Communication, facilitation, negotiation and mediation skills. The expertise of the regional coordinators included: management skills, media skills, communication and networking skills, and understanding of complex environmental and sustainability issues. These skill sets proved invaluable. CBM groups or networks need to develop or search out such skills (section 4.3.8).

- Inter-personal skills are necessary to work and contribute to community governance structures. Many of the successes of this project can be attributed to coordinators' strong commitment to building relationships to foster a community-driven and defined CBM process.

6.7 Achieving influence

Evidence from the CBM initiative, although very preliminary, suggests that CBM groups and networks attempt to exert influence in three ways:

i.   On government policy development and decision making;
ii.   On the general public through transforming peoples values;
iii.   On industry and business through influencing the triple bottom line (social, environmental, economic sustainability).

As discussed above, the collaborative approach through partnership development and networking and operating through open forums appears to be useful toward influencing government policy development and decision making. Often, government staff are pleased to participate in such forums. This provides these individuals with the information and opportunity to be part of innovative discussions on timely community issues. The transfer of information and ideas to their agencies is invaluable for CBM groups.

Furthermore, experience from the initiative suggests that networking with politicians is also critical to develop support for CBM (section 4.3.12). Developing institutionalized access to government structures is required (Box 16).

BOX 16: Institutionalization is "the development of organizational capacity to foster compliance with particular rule systems" (Francis, Personal Communication), in the case of CBM, rule systems associated with local governance. Civil society organizations (NGOs) display three types of institutionalization (i.) organizational growth – the growth of the number of organizations belonging to the movement, the growth of the individuals within each organization and the growth of an organization's financial resources; (ii.) internal institutionalization – professionalization and centralization; and (iii.) external institutionalization – transition from an unconventional action repertoire to more conventional that allows for cooperation with government and private sector actors (van der Heidjen 1997).

In terms of influencing public values, a number of the CBM groups are using activities such as river clean-ups to inform community members of their existence and recruit members. Participation by citizens in such activities has transformative educational value.

Finally, several communities in the initiative developed relationships with industry and business. It is felt that there is significant potential in this area. Over the past decade or so, many corporations and other private sector interests have joined efforts in officially expressing commitments to sustainability.

While cost savings gained through new efficiencies often represent the central motivation for business and industry efforts on sustainability issues, there is also a range of other drivers. These include (Sustainable Systems Associates, 1998):

- Better relations with residents of local communities,
- Promotion of industry wide self-regulation,
- Enhanced due diligence protection,
- A mechanism to deal with civil society pressures,
- Lower insurance premiums,
- Lower bank loan rates due to decreased risk, and
- Inclusion in ethical funds

The best ways for CBM groups to achieve influence within the community at large appear to be (section 4.3.12):

- Actively seek out partnerships with government staff at the municipal, provincial and federal levels, as well as politicians to influence policy development.
- Focus on transforming public values by engaging people in monitoring and stewardship activities.
- Build partnerships to collaborate with, and influence, business.
- Build the capacity of decision makers and governance institutions.
- Include achieving influence as a priority for CBM groups and network activities.

6.8 Public Participation

Evidence from the initiative suggests that CBM activities can contribute to public participation. Traditional public participation is driven by legislation dealing with such activities as land use planning and environmental assessment. Public participation is usually stand-alone, project-specific and designed to meet minimum legal requirements. Such processes obviously have an important place in planning and management, but certainly can be complemented by activities such as CBM. The key observation here is that traditional approaches are top-down, require "marketing" to inform the public of participation opportunities and conclude at the end of the planning or assessment process.

In contrast, CBM initiatives can result in networks becoming established that operate through open forums with participants including the public, stakeholder groups, government staff and the private sector. Information is collected and evaluated, and shared with decision-makers, as a contribution to decision making, rather than presented in a traditional and confrontational process. These groups in many cases seek access to government processes that lead to institutionalization. This increases direct involvement in governance processes and brings to the table diversity, new information and ideas developed through collaboration and based on extensive capacity in the area of sustainability. These types of forums remain in place for the long term in keeping with collaborative planning processes espoused by the most progressive planning practitioners.

What appears to keep groups and networks together in the long term is the monitoring process, which is tied to community vision and interests (section 4.3.11), although this will require further study. Members of CBM groups may become motivated to share such information and to find institutionalized processes such as public participation to influence

decision-making. Progressive local governments could take advantage of such forums to inform on local development projects and policy initiatives (e.g., environmental advisory committees and round tables).

The CBM initiative showed that for public participation to be effective, the following elements are needed (sections 4.3.2, 4.3.5, and 4.3.8):

- Public understanding of the benefits and values of long-term ecological monitoring.
- Participation opportunities that are meaningful and do not exceed capacity (e.g., time and energy of volunteers, accessible protocols, equipment and data analysis).
- Use of transparent, inclusive, constructive, efficient, and meaningful processes of public participation.
- Establishment of open and transparent forums such as roundtables, workshops, and visioning sessions that bring together multi-stakeholders (all groups and individuals interested in monitoring and sustainability: citizens, government staff, politicians, NGOs and the private sector).
- Forums that favour consensus-based decision-making, maximize evaluation of data and the development of creative solutions to complex problems.
- Feedback to broader community of monitoring results and how they are used.

Participation in CBM can lead to a commitment to seek out other participation opportunities or to instigate participation processes (e.g., visioning, watershed management plans, etc.).

6.9 Scale of Community Based Monitoring

CBM can operate at various scales, from the local neighborhood through to the landscape level defined by ecosystem boundaries such as watersheds. Scale depends on the goals of the group or network, their vision and available capacity and resources. New groups need to consider these variables, possibly starting at a smaller scale and expanding as capacity develops.

Results suggest that with development these approaches and tools can be applied to landscape level issues, such wildlife habitat and biodiversity, as well as the maintenance of resilience and ecological functions.

A notable observation from the CBM initiative was the tendency of the coordinators, each responsible for two or three communities, to link together the initiatives based on ecological boundaries (e.g. watersheds) or ecological issues (e.g. water quality and quantity). This linking resulted in CBM occurring at the landscape level. Coordination between multiple communities appears to have been a natural progression in the CBM initiative (section 4.3.7). Participants used ecological boundaries rather than an administrative boundary to define the monitoring efforts. CBM at the landscape scale has a number of potential benefits: increasing potential access to greater resources; increasing access to more historical monitoring data due to the larger area; and increasing the number of government agencies, NGOs and private sector actors with which to network and partner. In addition, monitoring efforts can be integrated, avoid duplication, and influence decisions on a broader scale.

Issues that affect several communities can inspire cross-jurisdictional partnerships (e.g., resource management issues or remediation and restoration needs), resulting in multiple communities working together within the same ecological unit (e.g., within a watershed) to resolve common problems.

6.10 Social capital

Overall, evidence from the CBM initiative suggests that a significant amount of social capital in the thirty-one communities has been developed that will allow many of the initiatives to continue into the future. Social capital is the combination of people and their skill sets and trust of one another that allows for commitment to working together for the betterment of their community.

Many individuals, who had never before volunteered for issues dealing with sustainability, are now developing capacities in various areas and commitment to CBM. These reserves of social capital will be valuable to the future of CBM in the participating communities. Furthermore, social capital has also been developed at the national level as various individuals have explored the idea of turning the emergent Canadian Community Monitoring Network (CCMN) into a more formalized organization.

7.0 Key Outcomes from the CBM Initiative

This concluding section is organized around the projected outcomes identified in the VSI proposal (EMAN-CO, 2001). Each outcome was introduced in section 1.0 and is discussed in some detail below.

7.1 Nationally consistent approaches to community monitoring of ecosystem changes

Significant progress has been made toward the development of a nationally consistent approach to CBM. Thirty-one communities have been engaged in CBM establishment and implementation following a similar conceptual framework.

The CBM initiative tested a CBM conceptual framework. The findings from this test have been applied to the development of an enhanced framework (Figure 3). The approach to CBM incorporates phases of community mapping, participation assessment, capacity building and information delivery. The approaches themselves must be appropriate to local context, respecting community and ecological diversity; iterative in nature and adaptive to change.

One of the key lessons learned is that community and ecological complexity render a linear stepwise framework for CBM limiting. Some communities have limited capacities and will need to do extensive preparatory work to develop the infrastructure necessary to carry out monitoring. Others have significant existing capacity and may be carrying out CBM already. Furthermore, ecosystems will vary greatly from one part of the country to another. As such, a nationally "consistent" approach to CBM will need to be flexible and adaptable, consisting of multiple tools including monitoring protocols and information management techniques.

The NatureWatch protocols including FrogWatch, IceWatch, and PlantWatch and WormWatch constitute some of the main ecological monitoring protocols utilized by the communities involved in this CBM initiative. These have all been tested and standardized by EMAN CO. Work continues on other protocols and should be given priority in order to provide needed protocols to CBM initiatives across the country.

Communities also implemented various other monitoring protocols relevant to them as defined by their visioning and sustainability needs. The enhanced framework allows communities to choose to implement nationally consistent methods, or locally relevant protocols as appropriate. Use of standardized protocols that have been tested for use across Canada like the NatureWatch programs allow for integration across and comparison between various communities, which contributes to our understanding of broad issues such as climate change and biodiversity. Locally relevant protocols support progress toward sustainability by monitoring issues of specific community relevance.

7.2 Enhanced ability to detect and report on ecosystem status and tends

The CBM initiative has engaged thirty-one communities across Canada, along with many stakeholders associated with each of the communities. Together these communities and stakeholders have become aware of EMAN, its objectives and services in support of monitoring. The incorporation of these communities into EMAN and exposure of the various stakeholders including government agencies, NGOs and private sector organizations has resulted in enhancements to the ability of EMAN as a network to detect and report on ecosystem status and trends. Consistent with EMAN from its inception, this initiative continues to build the infrastructure necessary to achieve national, as well as regional and local capacities to carry out monitoring.

A few communities moved beyond building CBM infrastructure and began program implementation. They began to collect locally relevant and scientifically valid data that measures key ecosystem characteristics (e.g., water quality) valued by the community.

7.3 Enhanced ability to provide timely information allowing responsive policy and priority setting

The CBM initiative has resulted in the development of the necessary infrastructure that will lead to an enhanced ability to provide timely information allowing for responsive policy and decision making at the local level in some participating communities. In some communities, the CBM initiative has also resulted in the development of trust, partnerships and lines of clear communication to meet this objective.

Extensive effort was devoted to develop the networks and organizational structures including pathways to institutionalization at the local level to allow for the collection, storage, analysis and reporting of monitoring data to inform decision making toward sustainability. This networking can and has contributed to responsive policy and priority setting activities.

7.4 Synthesis and national application of successes and lessons in community involvement and capacity building

The enhanced framework for Community Based Monitoring will form the basis for training and capacity development to bring additional communities into the Canadian Community Monitoring Network (CCMN) and will be "marketed" to sustainability and other community initiatives in Canada. This will be achieved through:

- a synthesis document, called *Improving Local Decision Making through Community Based Monitoring: toward a Canadian Community Monitoring Network*;
- a training manual for CBM coordinators and community groups (under development); and,
- a website that has been established for the CCMN (www.ccmn.ca).

Strong interest in the CCMN is expected based on the number of groups currently involved with CBM in Canada without any network support.

Research of the CBM initiative outlines potential benefits and challenges. It also outlines factors for success relevant to all parties involved including: community residents, decision-makers, local or regional coordinators, CBM champions and institutions, non-governmental organizations, industry partners, and government agencies.

Essentially, CBM can be most successful when it is locally appropriate and adaptive, it establishes information delivery mechanisms, provides meaningful opportunities to participants, is guided by strong coordination, builds collaborative partnerships in pursuit of sustainability, has broad influence and is supported nationally.

7.5 Establishment of a national voluntary sector network of communities monitoring for sustainability

The CBM initiative has established a core of thirty-one communities empowered and engaged in monitoring. One year is too soon for data to actually influence policy development and decision making in support of sustainability, however, the networks and partnerships and access to institutionalized processes have been established in many cases to do so once the data starts to become available. Furthermore, a number of initiatives have progressed from community level monitoring to landscape level monitoring.

The CBM initiative has underscored the value of indicators that can provide early warning to local decision-makers when their vision of sustainability is going off track so that they can respond effectively while the threat is still small and manageable.

The thirty-one communities have come to be known as the Canadian Community Monitoring Network (CCMN) and are starting to operate as a national voluntary network tied in at the community level to NGOs, government agencies, and the private sector in pursuit of inclusive decision-making and collaborative policy development. Furthermore, a number of CBM initiatives have developed regional networks designed to share information on approaches and to support one another.

7.6 Major contributions toward an informed public and sustainable communities

The CBM initiative has increased public understanding of ecological monitoring and sustainability in the thirty-one communities participating in this initiative. The initiative generated extensive media coverage. Furthermore, coordinators report that the community initiatives have also led to transformed environmental values among citizens.

The CCMN "experiments" have contributed toward building the social capital in participating communities that is critical to the success of any CBM program. Many new networks were formed or enhanced through the projects and the capacity of many communities has increased.

Not only have communities shown a natural progression to collaborate across different sectors and jurisdictions, they have also expressed an interest in playing a greater role in local governance: providing ecological monitoring information that is useful for decision makers.

7.7 Summary

In summary, the key outcomes for the CBM initiative include:

- An enhanced conceptual framework for Community Based Monitoring;
- The establishment of a national network of communities monitoring ecological sustainability;
- An enhanced ability to gather information on ecosystem status and trends;
- An enhanced ability to deliver timely information for responsive management;
- Emergence of the importance of indicators that provide early identification of environmental change; and,
- Increased development of an engaged, informed public.

In conclusion, although in the early stages of development, the project team believes the results of this initiative, in the form of the enhanced conceptual framework for CBM and the creation of the Canadian Community Monitoring Network, will contribute to developing CBM capacity in Canada, community empowerment, meaningful public involvement, adoption of adaptive management at the local level and progress toward sustainability.

8.0 Recommendations

The Community Based Monitoring initiative has been the most inclusive and complete look at local level CBM in Canada to date. With input from over 12,000 participants (volunteers, scientists, local decision makers, government partners, academics, industry representatives), the emergent Canadian Community Monitoring Network has developed a standardized approach and tool set to engaging communities in CBM. The enhanced framework for Community Based Monitoring outlines the most comprehensive and cost-effective directions for communities to monitor, track and respond to local environmental issues, while building the capacity to participate in a national environmental reporting system.

The following recommendations are presented to:

- Build on the results of this VSI project in terms of community capacity development in support of volunteerism and sustainability.
- Clearly identify the tasks required to better support and facilitate CBM in Canada through the Canadian Community Monitoring Network.

8.1 The Emergent Canadian Community Monitoring Network

The CCMN and CBM together provide a unique and much-needed mechanism to fully deliver on the objectives and agendas of a number of organizations including Environment Canada, other federal resource departments, Provincial/ Territorial agencies, municipalities, the NRTEE Conservation of Natural Heritage Task Force, the Federation of Canadian Municipalities, Conservation Authorities, Regional and County planning, Biosphere Reserves, etc. All share an interest in stewardship, sustainable management, public engagement and enhancing the effectiveness of science.

To ensure the continuation and growth of the Canadian Community Monitoring Network, support activities must continue at a national scale in the following areas:
- Capacity building for monitoring: ongoing protocol development, training, equipment lending, information management, data evaluation and reporting.
- Capacity building on means to develop and nurture networks and partnerships, leadership skills, advocacy, negotiation and communication.
- Research into possible applications of the enhanced framework for CBM in Canada at broader scales such as watershed or wildlife corridors, where multiple communities are involved.
- Marketing of the CCMN through promotional material outlining the services of the Network
- Centralized network coordination.

Federal Government support

Collaboration and partnership will continue to be the basis of the CCMN. The Federal Government should act in the common interest to ensure the availability and effectiveness of

the CCMN by providing an ongoing foundation through the EMAN Coordinating Office consisting of national coordination, scientific support and funds to initiate, facilitate and contribute towards collaborative community initiatives.

Canadian Community Monitoring Network organization

The structure of the CCMN has started to self-organize. Discussions are focused on creating a not-for- profit charitable organization or some other entity to oversee the network. This effort should be encouraged by Environment Canada and the CNF. Both of these founding organizations should participate as board members of the new organization that forms to oversee CBM in Canada.

A vision and mission statement should be created by those engaged in the CCMN pilot year and additional communities that may become involved. Preliminary visions for the CCMN, as generated at the Canmore workshop are presented in Appendix 8A.

Champion organizations and individuals should be identified in each CBM community and be linked between regions and across provinces, through the Canadian Community Monitoring Network. Some regional coordinators recommended a multi-tiered CCMN structure with provincial-level training and databases that link to the national-level management. Leadership should come from citizens and community groups as well as from broader partnerships.

Further Research

Further research should be carried out in support of the CBM initiative, to track success over longer periods of time, identify key variables for success within specific community contexts, monitor how challenges to CBM are resolved, and whether the full range of potential benefits is realized.

Application and development of the CBM initiative results should be pursued through partnerships with additional communities, parks, protected areas and landscapes, nationally and internationally.

8.2 Capacity Building

To further build capacity, CBM initiatives across the country should be provided with an extensive toolbox of techniques in the form of a "How-To" manual[10] that makes implementation of the model for CBM accessible and practical for citizens. Requested by CBM groups and regional coordinators, the manual should deal with CBM establishment, CBM protocols, information management approaches, styles of collaboration and visioning in an in-depth manner. Specific scenarios for planning CBM will help tailor local approaches

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[10] For examples of similar community training manuals, see the International Council for Local Environmental Initiatives or the Canadian Parks Partnership.

to each unique community. The "How To" manual should be developed immediately and marketed to all CBM groups across the country.

The model for CBM in Canada should guide the development of the training manual and be structured so as to provide tools and techniques such as illustrated in Figure 5.

Community Mapping:
- Reconnaissance tools and network building
- Education techniques for public understanding of monitoring
- Governance analysis to understanding the linkages between 'players' involved in monitoring
- Introduction to sustainability indicators
- Examples of visioning processes for sustainability

Participation Assessment:
- Consultation, outreach, and membership skills assessment techniques
- Introduction to decision making processes (municipalities, land-use planning and protection)
- Facilitation skills for leading neutral forums such as roundtables and collaborative partnerships

Capacity Building:
- Information management and work planning
- Project evaluation and measurement (e.g., in-kind support)
- Ecological monitoring protocols and criteria for participation
- Field training techniques and 'Train the Trainer' models

Information Delivery:
- Storage, analysis and reporting of monitoring data
- Translation of data into information
- Techniques for early identification of threats, thresholds, and trends
- Mechanisms for feedback and volunteer appreciation
- Community applications of Geographic Information Systems
- Communication of monitoring information to decision makers.   Figure 5.

8.3 Information Delivery and Influence

Enhancing the Effectiveness of Community Monitoring

In order to enhance the effectiveness of monitoring at the community level, information needs to be grounded in a common local vision of goals for the community and the identification of valued ecosystem functions and characteristics. As suggested in the Community Mapping phase, the initial step in monitoring design is the establishment of a community definition of sustainability. This definition should be based, for example, on a question like "what would we not wish to compromise in the pursuit of local development?" Items like 'swimable' and 'fishable' waters, and healthy air, trees, wildlife, and soils are the commonly identified characteristics. Scientific indicators based on standardized methods or protocols can be provided for tracking these key features.

Initial emphasis should be placed on conducting a survey of the area using the protocols so chosen. This will establish present conditions, identify issues of community concern and foster a sense of ownership and place. If the survey shows that present conditions are an acceptable reference point, subsequent monitoring using those protocols will indicate when sustainability, as locally defined, is going off track. These signals will provide early warning to decision-makers of possible threats, which can feed into adaptive responses. These responses might include verification of the problem, investigation of the cause, research into mechanisms, and the development of management options.

Environmental information required for community-based decision-making should be:
- Targeted and relevant to problems and players;
- Accessible and understandable to the audience;
- Integrated;
- Usable (form and context); and
- Timely.

To be effective, the delivery and communication of monitoring information should in addition:
- Suggest a course of action;
- Allow decision-makers to weigh consequences; and
- Make those involved feel they are in control of the problem.

CBM groups should seek access to local government public participation processes (as well as provincial and federal government processes where appropriate) in order to maximize the influence of their monitoring data.

Local governments should seek out CBM groups and utilize these groups and their information and expertise to complement their existing public participation processes.

8.4 Public Participation, Collaboration, and Social Capital

Public Participation

CBM groups and networks should establish open forums such as roundtables, workshops, and focus groups to carry out their own public participation processes. Local municipal staff and Provincial Ministry staff should be invited to sit as permanent members of the open forums established. This leads to information sharing, discussion of the significance of data, and development of innovative solutions. These solutions influence the organizational culture of the organizations represented by the participating stakeholders. Results should also be shared with local councils, through meetings with council members and community leaders.

CBM initiatives should actively market monitoring activities and related activities such as river clean-ups, stewardship, restoration, etc. as these lead to learning and value changes which can move society closer to sustainability.

Collaborative Approaches

Collaborative approaches should be the primary method of establishing and implementing CBM. Open forums should be established and all interested parties invited to participate including NGOs, government agencies, and the private sector. The CBM group or network should be the facilitating body and a power-free environment should be sought where all participants are equal, allowing for creativity, information sharing and innovative solution development.

Social Capital

The ultimate purpose of CBM should be considered to be the development of social capital. Social capital results in a vibrant civil society engaged in community activities. Social capital is the combination of skill sets, shared values, respect, and trust within a community of people that allow for cooperation for mutual benefit.

In terms of CBM, social capital will ensure that there are sufficient volunteers needed to carry monitoring forward and ensure that the results are properly shared with the community and all interested decision makers.

8.5 Summary

The Emergent Canadian Community Monitoring Network

- The Federal Government should continue to support CBM in Canada through national coordination, scientific support, and funds to initiate, facilitate and contribute towards collaborative community initiatives.
- Environment Canada and the Canadian Nature Federation should participate as board members for the new organization.
- A vision and mission statement for the Canadian Community Monitoring Network should be created.
- CBM champions should be linked through the network.
- Further research should be carried out in support of the CBM initiative, to track success over longer periods of time, identify key variables for success within specific community contexts, monitor how challenges to CBM are resolved, and whether the full range of potential benefits is realized.
- Application and development of these CBM initiative results should be pursued through partnerships with additional communities, parks, protected areas and landscapes, nationally and internationally.

Capacity Building

- Capacity should be built through a training manual for Community Based Monitoring groups; development of the manual should be guided by the enhanced framework for CBM, and marketed to all CBM groups and related organizations across the country.

Information Delivery & Influence

- The effectiveness of ecological monitoring should be enhanced at the community level through community visioning, selection of goals, indicators and monitoring protocols.
- Environmental information for decision-making should be targeted, accessible, integrated, useable and timely.
- Community Based Monitoring groups should seek to influence local government; while government should seek guidance from CBM groups

Public Participation, Collaboration and Social Capital

- Community Based Monitoring groups should establish open forums for public participation and results from collaboration should be shared with local councils and community leaders.
- Community Based Monitoring initiatives should actively market related stewardship activities such as river clean-ups or restoration projects, as these engage the community in moving closer to sustainability.
  Social capital should be seen as one of the most valuable products of Community Based Monitoring.

References

Au, J., Bagchi, P., Chen, B., Martinez, R., Dudley S.A. and Sorger, G.J., 2000. 'Methodology for public monitoring of total coliforms, *Escherichia coli* and toxicity in waterways by Canadian high school students', *Journal of Environmental Management*, 58, 213-230.

Bird Studies Canada, 2003. [http://www.bsc-eoc.org].

Canadian Nature Federation, 2003. [http://www.cnf.ca].

Bliss, J., Aplet, G., Hartzell, C., Harwood, P., Jahnige, P., Kittredge, D., Lewandowski, S., Soscia, M. L. 2001. 'Community-Based Ecosystem Monitoring.' *Journal of Sustainable Forestry* 12: 143-167.

Canada MAB. 2000. 'Landscape changes at Canada's Biosphere Reserves,' Environment Canada, Toronto, Ontario, Canada, pp 56.

Citizens' Environment Watch, 2000. 'Final Report of a Workshop on Community Based Monitoring,' April 7-8, 2000. University of Toronto, Canada.

Ecological Monitoring and Assessment Network Coordinating Office. 2002. [http://www.eman-rese.ca] and NatureWatch [www.naturewatch.ca].

Ecological Monitoring and Assessment Network Coordinating Office, 2001. The Revised Ecological Monitoring and Assessment Network Coordinating Office proposal: *Linking community-based ecosystem monitoring to local decision-making and policy development on sustainability, Voluntary Sector Initiative*, Environment Canada, Canada Centre for Inland Waters, Burlington, ON, Canada, 25pp.

Environment Canada: 2002, 'Long-term monitoring makes a difference,' Wildlife Watchers Report on Monitoring, Issue 8, Spring 2002, Web site viewed on June 4, 2002, [www.on.ec.gc.ca/wildlife/newsletters/watchers02-e.html]

Gibson, Robert B., ed., 1999, Voluntary Initiatives and the New Politics of Corporate Greening, Peterborough: Broadview Press.

National newsletter of Volunteer Monitoring, 2000. 'Issue Topic: Monitoring Fauna', *Volunteer Monitor*, Vol 12, No. 1.

O'Neill, H., M. McKim and Rainer, R. 1995. 'Community-based water quality Monitoring' in T. Herman, S. Bondrup-Nielsen, J.H. Martin Willison, and N.W.P. Munro (eds), *Ecosystem Monitoring and Protected Areas*, Proceedings of the Second International Conference on Science and the

Management of Protected Areas, Dalhousie University, Halifax, Nova Scotia, Canada, 447-453.

Painter, J. 2001. Governance, The Dictionary of Human Geography, 4th edition eds. R.J. Johnson, D. Gregory, G. Pratt and M. Watts, Blackwell publishers, Oxford, UK and Massachusetts, USA

Pollock, R.M. 2002. 'Community Based Ecological Monitoring: Sustaining Citizen Engagement.' Dissertation submitted for the M.Sc. in Public Understanding of Environmental Change, University College London, England.

Pollock, R.M. 2003. 'Evaluation and Enhancement of a Conceptual Framework for Community Based Monitoring in Canada': research report prepared for the Canadian Nature Federation and the Ecological Monitoring and Assessment Network Coordinating Office in support of the Voluntary Sector Initiative Final Report for *Linking Community Based Monitoring and Policy Development on Sustainability*.

Sharpe, T., Savan, B., and Amott, N., 2000, 'Testing the waters', *Alternatives* 26, 30-33.

Simmons P.J. 1998. 'Learning to live With NGOs', *Foreign Policy*, Fall 1998.

Stadel, A.V. and Nelson, J.G. 1995. 'The role of citizen participation in ecosystem Monitoring', in T. Herman, S. Bondrup-Nielsen, J.H. Martin Willison, and N.W.P. Munro (eds), *Ecosystem Monitoring and Protected Areas*, Proceedings of the Second International Conference on Science and the Management of Protected Areas, Dalhousie University, Halifax, Nova Scotia, Canada, 447-453.

Stokes, P., Havas, M., and Bridges, T., 1990. 'Public participation and volunteer help in monitoring programs: an assessment', *Environmental Monitoring and Assessment*, 15, 225-229.

Sustainable Systems Associates Ltd. 1998. 'Applying Sustainable Development to Business: Realizing the Benefits,' prepared for Ontario Ministry of the Environment.

Watershed Report Card: 2003, Watershed Report Card Explained, Web Site, viewed on January 6, 2003, [www.watershedreportcard.org/wrcexplained/index.htm].

Whitelaw, G. 2002. 'Organizing Community Based Ecosystem Monitoring In Canada,' draft research report for the Canadian Nature Federation and the Ecological Monitoring and Assessment Network Coordinating Office, Environment Canada, pp 96.