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Collaborative Learning Guide

FOR ECOSYSTEM MANAGEMENT

Practicing Ecosystem Management Where People Live, Work and Play

People who live, work and play along Maine's southern coast value the sandy beaches, rocky tide pools and salt marsh lined estuaries for the profound effect these have on our quality of life. The desire to protect these places is motivated by deeply held values about the importance of clean water, the need to protect habitat for wildlife and a commitment to saving special places. Our children and grandchildren can explore these natural landscapes that have shaped the lives of the community for generations. The people of southern Maine, like people everywhere, manifest their commitment to the places where they live and work through their jobs, membership on town boards and participation in community service groups and organizations such as land trusts and watershed associations. This is the social capital of ecosystem management. When this resource of knowledge and expertise is engaged in a collaborative manner, it becomes a powerful force for community sustainability.

Community-based ecosystem management is an approach to getting things done. It manifests as actions that collectively maintain or restore nature's ability to provide clean water, clean air and support for living systems. Sustaining the earth's natural capital requires integration within the system of social capital. Through collaboration, people can accomplish the first step toward sustainability – the development of a collective vision of desired future outcomes for the places where they live, work and play. The individual perspectives that shape these visions take many forms. They are present in town Comprehensive and Open Space plans, in mission statements for organizations and agencies, in public opinion surveys, management plans and research reports. This booklet is a guide to using a collaborative approach to community-based ecosystem management. It is based on seven years of social science research and my experience with a project that created a shared vision for clean water that united a group of planners, managers, community leaders and scientists with a common vision - Protecting Our Children's Water.

From my perspective as a coastal ecologist and educator, this project profoundly changed the way I perceive, understand and approach the application of science to management and policy. After years of labeling myself an ecosystem manager, I finally became one by experiencing the process of integrating ecological, socioeconomic and institutional perspectives. This integration process has a name - Collaborative Learning. This guide describes a practical method for transforming the science to management paradigm from the traditional Delivery of Science-based Information model in figure 1 to Engaging the Kaleidoscope of Expertise model in figure 2. I believe that incorporating this method into our repertoire of strategies for implementing ecosystem management has the potential to improve environmental outcomes, especially where scientific uncertainty challenges us to tap the collective wisdom of everyone with a stake in a sustainable future.

Christine Baumann Feurt

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Figure 1. Delivery of Science-based Information
The traditional model of providing science to decision-makers is limited with complex issues where scientific uncertainty is high.

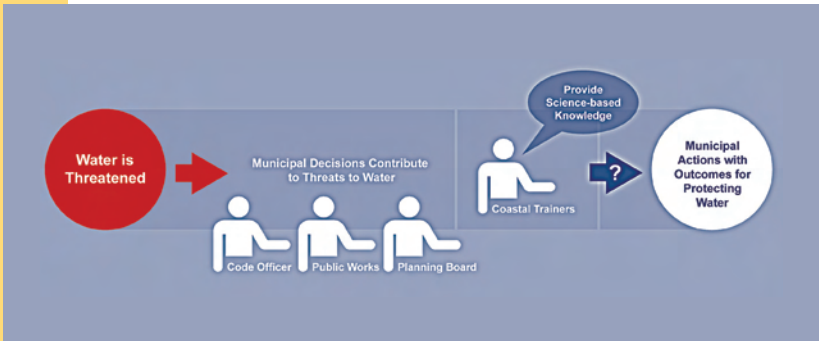
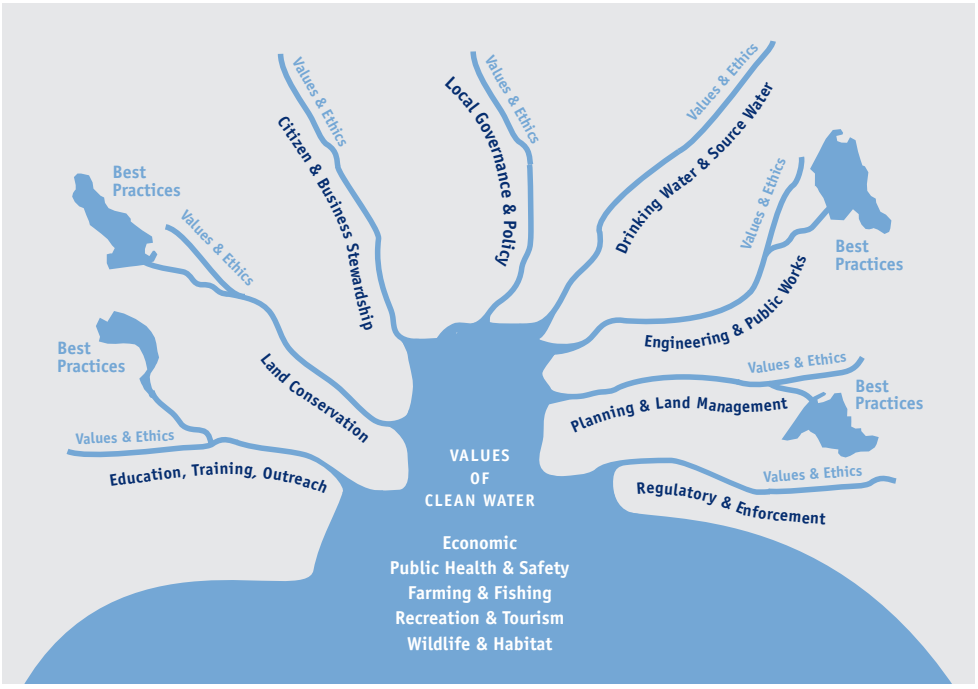
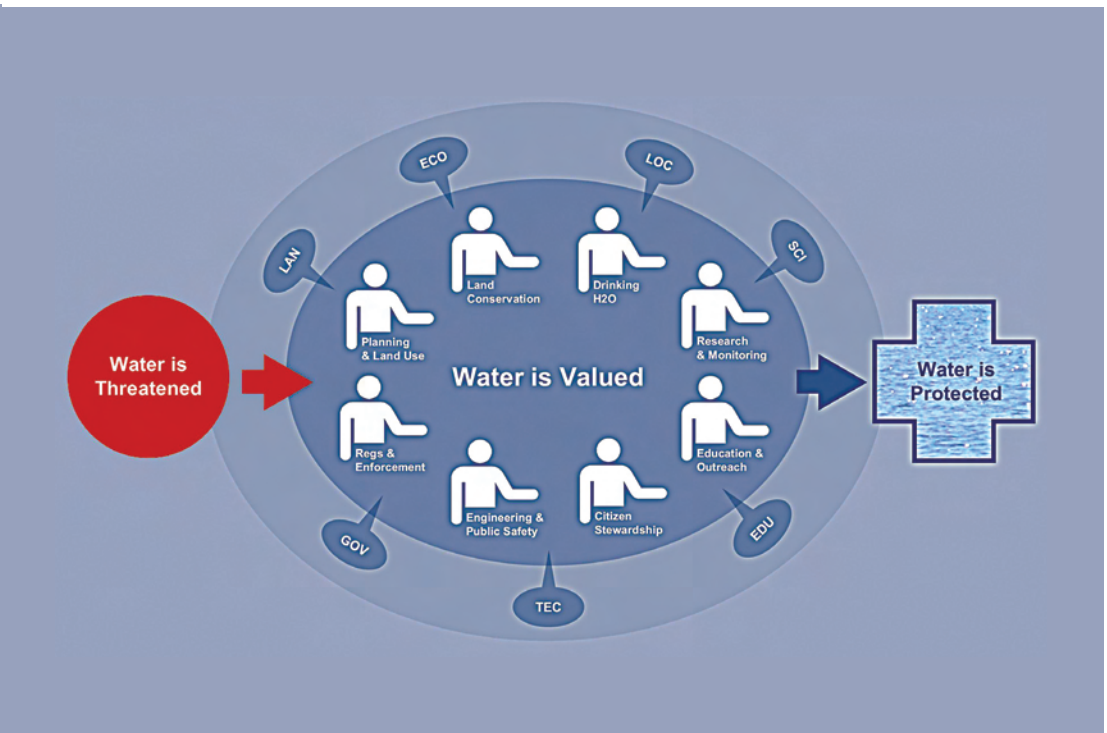


Figure 3. The Social System Influencing Water Quality and Quantity



community-based

Figure 2. Engaging the Kaleidoscope of Expertise
Collaborative Learning taps collective knowledge and expertise as a resource for problem solving. Pages 6 & 7 explain the development of this model.



Community-based Ecosystem Management Connects Social Capital and Natural Capital

Shared values about the importance of clean water motivate a social system of practitioners and advocates in southern Maine. Like the tributaries of a watershed, the elements of this social system affect the quality and quantity of water that collects and flows to estuaries at the land sea interface. The eight elements of this social system, shown in Figure 3, interact to protect the values associated with clean water. Work within each element of the system is guided by professionally established best practices and a set of values and ethics that define the culture of the group. Science plays a role in this social system by shaping best practices and providing feedback about the ability of actions taken by each group to achieve goals in alignment with group values and professional ethics. The professional expertise of people working within this social system is augmented by commitment to the communities they serve and attachment to the places where they work, play and raise their families.

Collaborative Learning: An Expert Practice for Ecosystem Management

ECOSYSTEM MANAGEMENT IS...

"An approach to maintaining or restoring the composition, structure and function of natural and modified ecosystems for the goal of long term sustainability...based on a collaboratively developed vision of desired future conditions that integrates ecological, socioeconomic and institutional perspectives applied within a geographic framework defined primarily by natural ecological boundaries" (Meffe, et al., 2002)

COLLABORATIVE LEARNING IS...

"A framework and set of techniques intended for multiparty decision situations... a means of designing and implementing a series of events to promote creative thought, constructive debate and the effective implementation of proposals that the stakeholders generate." (Daniels and Walker, 2001)

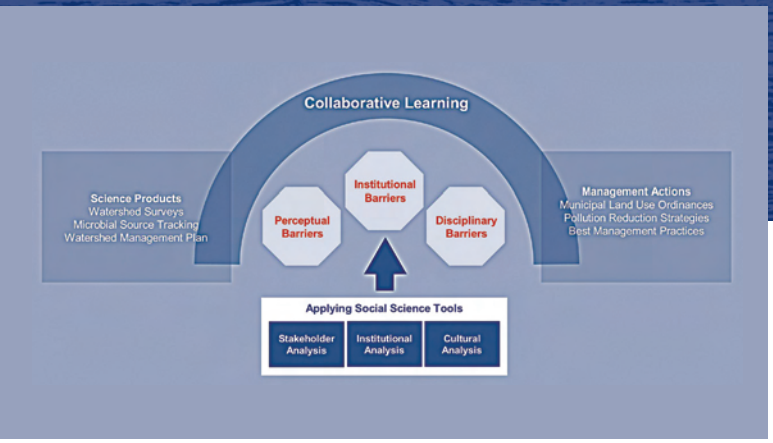


Figure 4. The Collaborative Learning Bridge

Collaborative Learning, informed by social science research, can be used to bridge the gap between scientific research findings and the application of that research to inform policy and management. Improved understanding of the barriers separating scientific disciplines, organizational approaches and conflicting perceptions of the nature of environmental problems can be used to design an effective Collaborative Learning Bridge. Figure 4 is a model of the bridge for the Protecting Our Children's Water project.

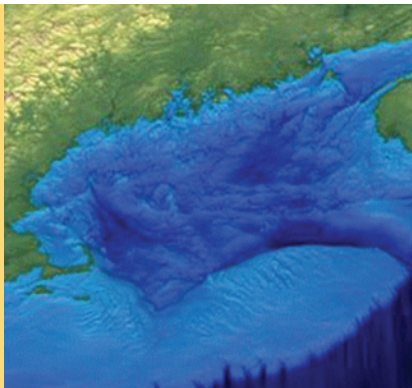
A New Social Contract for Science

A decade ago in her call for a "new social contract for science," marine biologist Jane Lubchenco recognized the need for innovation in the way that science serves the needs of society (Lubchenco, 1998).

A new breed of interdisciplinary professional is responding to that call with innovative tools for environmental communication, stakeholder engagement, public participation and collaborative problem solving. The National Estuarine Research Reserve System (NERRS) developed a national program in 2001 to improve the use of science in coastal decision-making and policy. The Coastal Training Program expanded the traditional role of the NERRS beyond research, education and stewardship to include training and technical assistance to decision-makers served by each Reserve. The Wells National Estuarine Research Reserve, with funding from the Cooperative Institute for Coastal and Estuarine Environmental Technology, used innovative social science research to develop a Coastal Training Program based upon the principles of ecosystem management and the practice of Collaborative Learning. This guide presents key lessons learned from this approach as one model for achieving the new social contract for science.

communication

"The whole system of science, society, and nature is evolving in fundamental ways that cause us to rethink the way science is deployed to help people cope with a changing world. Scientists should be leading the dialogue on scientific priorities, new institutional arrangements, and improved mechanisms to disseminate and utilize knowledge more quickly." (Lubchenco, 1998)



The Purpose of this Guide

This guide presents Collaborative Learning as an expert practice for designing, implementing and evaluating the dialogues that support ecosystem management.

Facilitating collaboration among scientists, planners, regulators, policy makers and managers is a key ingredient of ecosystem management. These dialogues develop the shared vision and desired future outcomes that guide the practice of ecosystem management. Collaborative dialogues create bridges connecting diverse areas of expertise and knowledge. The resulting network of connections, the kaleidoscope of expertise, can be cultivated and maintained as a resource for ecosystem management.

The Protecting Our Children's Water project used the Collaborative Learning approach to understand the ways that people in southern Maine valued water, the different kinds of knowledge people applied in their jobs protecting water and the interconnected system for water management operating at the municipal level.

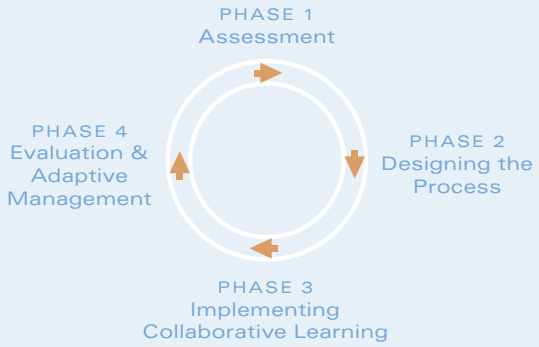
Understanding this kaleidoscope of expertise as a resource for problem solving, rather than a receptacle for science information, revealed the collaborative potential inherent in regional water management. Collaborative Learning was used to tackle one of the most common challenges of ecosystem management - translating the recommendations of a science-based plan into management actions that sustain ecosystem structure and function. Engaging the kaleidoscope of expertise in Collaborative Learning activities during the past seven years influenced the design of workshops, the development of research proposals and the nature of partnerships among governments, organizations and agencies responsible for water protection in southern Maine. Key lessons for ecosystem management are presented in this guide.

What is Collaborative Learning?

Collaborative Learning is an interdisciplinary approach adapted to facilitate ecosystem management. This guide uses the principles and practices of Collaborative Learning developed by Steven Daniels and Gregg Walker in their book *Working Through Environmental Conflict, the Collaborative Learning Approach*.

Collaborative Learning consists of techniques designed to facilitate shared understanding of complex environmental issues. Collaborative Learning combines presentation of information with dialogue to allow participants to clarify the scope and definition of problems. Techniques of Collaborative Learning support the development of strategies that reconcile conflict in order to focus on the design and implementation of solutions to environmental problems.

Collaborative Learning brings key ideas from complex systems theory, conflict theory and adult learning theory together into a set of practical principles and adaptable techniques. These techniques are designed to stimulate creative discussion despite conflict and controversy. The surprising goal of Collaborative Learning is not consensus but group-generated strategies for improving a situation. This guide explains the process of Collaborative Learning used in the Protecting Our Children's Water project with the goal of distilling key elements that can be adapted to other multi-stakeholder ecosystem management projects.



SIX COLLABORATIVE LEARNING PRINCIPLES

1 **PROCESS**

The process of Collaborative Learning follows the cycle of experiential adult learning: assessment, design of an action strategy, implement the strategy, evaluate results, design next action.

2 **RELATIONSHIPS**

Stakeholders are considered equal partners. Differences in knowledge and worldview are respected and treated as resources for collective problem solving.

3 **COMMUNICATION**

Competent communication among stakeholders is honest, sincere, understandable and appropriate. Respectful procedures exist for fostering dialogue that contributes to shared understanding of areas of agreement and disagreement. Consensus is not required in order to make progress on shared goals.

4 **INCLUSION**

To the extent possible all groups with a stake in solving the problem should be represented in order to consider diverse aspects of the issue (scientific, political, economic, legal, etc.). Strive to identify and include people who will provide comprehensive perspectives on the problem being addressed and are in a position to take actions that will move toward the desired outcomes.

5 **PARTICIPATION**

Stakeholders are actively involved in the co-creation of knowledge about the nature of the problem to be addressed, development of an action strategy to make progress and selection of tasks that can be accomplished within their sphere of influence. Stakeholders should be willing to commit to these working principles.

6 **ROLE OF THE FACILITATOR**

Collaborative Learning facilitators are catalysts for innovation and change. Facilitators that support stakeholders as they analyze information and develop strategies that make sense in their work environment are succeeding.

(adapted from Daniels and Walker, 2001)

Protecting Our Children's Water & the Kaleidoscope of Expertise

Table 1. Ways of Knowing about Water in Southern Maine

Knowledge Domains	What They Understand	People Who Use this Knowledge
Ecological Knowledge (ECO)	Understanding the structure and functions of a watershed, the hydrologic cycle, connections between groundwater and surface water, and the value of ecosystem services provided by a watershed.	ecologists, farmers, hydrologists
Governance Knowledge (GOV)	Understanding the interrelationships among policy, regulations, government hierarchy, planning documents, ordinances, and the structures and processes in place to execute them.	town planners, code enforcement officers, elected officials, regulators
Land Use Knowledge (LAN)	Understanding the ways land management and conservation and the design of infra-structure and development can influence water quality and quantity, and the ways that the economic value and ecological value of land can be balanced.	town planners, farmers, developers, public works directors, water district managers
Educational Practices Knowledge (EDU)	Understanding how knowledge is generated and transferred among the knowledge domains. Designing and evaluating the effectiveness of education and outreach strategies.	education and outreach specialists, trainers, science translators, town planners
Science Knowledge (SCI)	Understanding the factors influencing water quality and quantity for the purpose of documenting conditions, monitoring change, understanding cause and effect relationships and evaluating the effectiveness of management practices and policies.	natural and social scientists, water quality monitors, regulators
Technology Knowledge (TEC)	Understanding the use and application of engineering and computer technologies to protect water, mitigate impacts, implement best management practices and restore lost structure and function in the watershed.	engineers, public works directors, GIS specialists
Local Knowledge (LOC)	Understanding the connections between the people and places in the community, including familiarity with town history, values and conflicts.	town planner, public works director, elected officials, farmers, developers

(Adapted from Feurt, 2007)

Seeing the System in Ecosystem Management

Collaborative Learning begins with an assessment. The assessment is a way of revealing the social system in ecosystem management.

The assessment for the Protecting Our Children's Water project used social science research tools to understand the values, knowledge and actions of people involved in all aspects of water use, protection and management in southern Maine. This section presents the key findings from that research as evidence of the potential for knowledge about the social system within which ecosystem management occurs to improve the design of education, management and research projects.

The Value of Water

Protecting Our Children's Water is a way of framing ecosystem management to unite people involved in many different jobs and activities. The phrase captures two aspects of ecosystem management – protecting water for people who may not have the power and authority to act for themselves and protecting water for future generations.

The phrase *Protecting Our Children's Water* taps deeply held values about water as the source of life, and water as a shared resource that is finite and vulnerable. The values inherent in *Protecting Our Children's Water* represent two central themes in environmental protection, the core concepts of the commons and sustainability. People working in jobs as public works directors, code enforcement officers, planners and selectmen share responsibility for actions to protect water for community residents today and in the future. People participating in the Protecting Our Children's Water project recognized six values of water shown in Figure 6 and described on page 7. Understanding shared values of water contributed to the development of the Collaborative Learning process.

professional practice

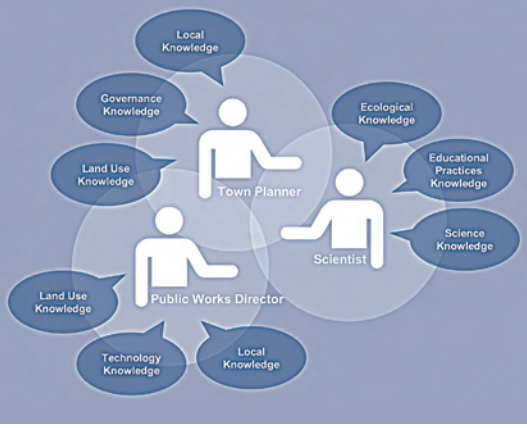


Figure 5. Combined Ways of Knowing

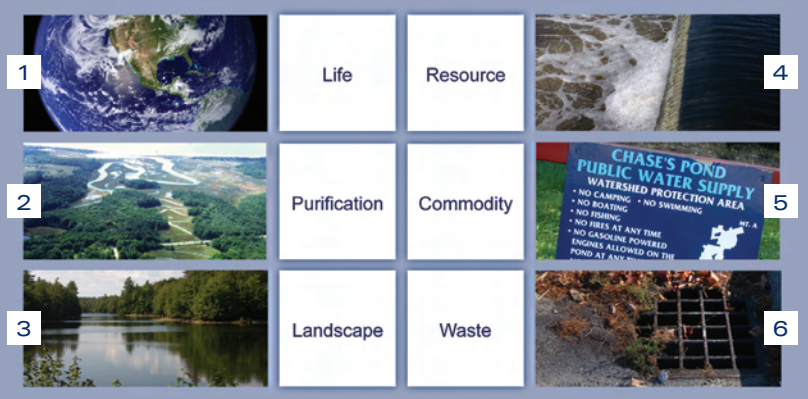


Figure 6. The Six Values of Water

"Discovering" the Kaleidoscope of Expertise

Knowledge about how people in southern Maine value water came from a series of interviews with people involved in municipal water management. The initial idea behind the interviews was to identify gaps in the knowledge of municipal officials that could be addressed by providing science based information.

Figure 1. (pg. 2) shows the concept model at the start of the interviews. The interviews changed everything. Figure 2 (pg. 3) represents the transformation of the linear concept of information delivery to a systems understanding of the knowledge and expertise residing in the municipal system for protecting and managing water. The metaphor of the Kaleidoscope of Expertise came from the realization that each person views water and their role in managing water through an individual lens affected by their education, training, work experience and the requirements of their job. Taken together, the combined knowledge and expertise of the people responsible for water is a resource for learning and problem solving. Collaborative Learning is a way to tap this resource.

Knowledge in the Kaleidoscope

Seven types of knowledge or ways of knowing about water emerged from analysis of the interviews of southern Maine water managers. The interviewees included people involved in scientific research and implementation of state regulatory programs, as well as municipal officials. During each open ended interview, people talked about their work, how they valued water, their ideas about threats to water, the causes and effects of those threats, and what could be done to protect water. The ways of knowing about water are described in Table 1 and coded into the Kaleidoscope of Expertise model in Figure 2. People use more that one type of knowledge in their work. Figure 3 illustrates a conversation at a Collaborative Learning workshop drawing from multiple ways of knowing.

Jobs & Activities in the Kaleidoscope

During the interviews people described the parts of their work related to water. In most cases, protecting water was one of many job re-spon-sibilities. Eight distinct categories of work contribute to water protection shown in Figure 2. Each category is founded upon educational traditions, shaped by codes of professional practice and accountable to ethical standards. Ecosystem management requires a method for bridging and integrating distinct categories of practice to engage the diversity of knowledge and expertise in problem solving. Collaborative Learning is one method for doing this.

Recognizing the Work Categories Engaged in Ecosystem Management

- Regulatory and Enforcement
- Planning and Land Use
- Engineering and Public Safety
- Citizen & Business Watershed Stewardship
- Education and Outreach
- Research and Monitoring
- Drinking Water Provision
- Land Conservation

THE SIX VALUES OF WATER

1 **Water is the Basis for Life on Earth**

Water is the basis of life on earth. Water is essential to humans, animals, plants and all living things. The biological, chemical and physical characteristics of water are the foundation of life processes from cells, to ecosystems, to global climate. Human health depends upon clean water. Despite its acknowledged value, water is taken for granted.

2 **Nature Makes Water**

Water and land in a natural state, linked as a watershed, function as a water collection, purification and storage system. Water and land are interconnected as part of a natural system. The hydrologic cycle, driven by the sun's energy and the pull of gravity, functions to produce, move, filter, store and clean water as a sustainable and renewable resource. Infiltration, filtering, buffering and other purification processes maintain the cycle. Plants, animals and microorganisms are part of the natural system. Humans benefit from the biofiltration services provided by this natural system.

3 **Water is Landscape**

People are drawn to aesthetic and intrinsic values of water in the landscape as a source of beauty, adventure, peace and serenity. Water landscapes are valued both as backdrops for residential and commercial properties and as sources of more intimate experiences of recreation like fishing, swimming, and boating. Just knowing that a favorite place in nature with clean water exists is a source of satisfaction even if the place is not visited.

4 **Water is a Resource for Humans to Use**

Clean water is good business. Clean, abundant water is economically important for residential, commercial, agricultural and industrial use. Property values, tourism, seafood harvesting and farming are dependent upon clean water. Water is a shared resource.

5 **Water is a Commodity**

Drinking water is a public and private commodity. Water is collected from the wild, processed to meet regulatory requirements and sold to meet residential, commercial and industrial needs. Water as a commodity may be sold for profit or as a public utility.

6 **Water is Waste**

Water used as a resource and contaminated as a result of that use becomes waste. Water also becomes waste when it is used as a deliberate or incidental receptacle for pollution. Contaminated water threatens public health and wildlife and looses value as a resource. Water that does not filter into the ground or stay within expected levels and pathways can create hazardous conditions.

(Adapted from Feurt, 2007)

Assessment: Understanding the Kaleidoscope of Expertise

Ecosystem management viewed as a way to maintain and improve the places where people live, work and play expands traditional thinking to include a larger pool of stakeholders and institutions. The concept of a Kaleidoscope of Expertise, developed during seven years of research and work in southern Maine watersheds, models this expanded idea of who is responsible for ecosystem management.

Developing an understanding of the unique Kaleidoscope of Expertise for your situation begins with a preliminary understanding of the situation based upon the ways that the planning team sees the problem, its causes and the people responsible for solving the problem. As you begin to listen to stakeholders, adopt an open attitude that actively seeks to enrich the preliminary model. The assessment phase is critical for understanding who the stakeholders are, what they know and value and how they might already be oriented in their work and committed to a solution. The assessment enables you to better understand the human system managing the natural system through the eyes of the people who live, work and play in the places where ecosystem management is taking place. The assessment prepares you to develop the blueprints for the design of the Collaborative Learning Bridge.

TIMEFRAME & RESOURCES REQUIRED

Allow two weeks with a team of two people to conduct the assessment. Ideally, the assessors are also the facilitators of the Collaborative Learning process. The planning team driving the project should meet with the assessors at the beginning and end of this phase. All meetings and listening sessions are documented with minutes that are reviewed and approved by participants. This phase of the process is pivotal. If you cannot devote time and resources to the assessment of a Collaborative Learning process reconsider using this technique.

1 Understand and Clarify the Nature of the Problem

A Collaborative Learning project is usually driven by an identified need to solve a problem. Developing a clear understanding of the problem situation as perceived by the project initiators is the first step of the assessment. The results of the planning team assessment for Protecting Our Children's water appear below. The declarative statements below are very simplified from the extensive discussion of the problem. This step allows you to see the problem system through the eyes of the project initiators. The situation map in Figure 1 (information delivery) was developed from the project initiators assessment. This initial model for action evolved to the Kaleidoscope of Expertise in Figure 2 as a result stakeholder listening sessions.

What is the problem?

Municipal officials are unconcerned and uninformed about the effects of land use decisions on nonpoint source pollution.

Why do you think this?

Water quality data has documented pollution levels. Watershed surveys have identified sources of nonpoint source pollution. A watershed management plan has been completed. The recommendations of the plan are not being implemented.

Who are the people who could become involved with the solution of this problem?

Science Educators, Town Managers, Elected Officials, Town Planners, Conservation Commissions, Code Enforcement Officers, Public Works Directors

What do you think these people could do to solve the problem?

Science educators can conduct workshops for municipal officials explaining the pollution levels and sources of pollution and give copies of the watershed management plan to participants. Municipal officials will be motivated to use the watershed management plan to change practices and develop projects to prevent pollution.

2 Identify Potential Stakeholders and Listen to Different Perspectives on the Problem

Using the ideas and list of potential stakeholders generated by the project initiators, contact 5 or 6 of the stakeholders asking for one hour of their time. Describe the purpose of the project and why you think they can help. Develop a few simple open-ended questions.

Do you think water pollution is a problem in town?

What do you think are the causes of this problem?

What do you think could be done to solve this problem?

Allow the stakeholders to respond in their own words, and be attentive to the perspectives that unfold. Listening is an art. Effective listening and note taking are essential to the assessment phase. Your goal is to understand the diversity of ways people think about the problem you are trying to solve. The dialogue that you facilitate will expand your understanding of the system within which the problem is embedded. Allow time immediately after the listening session to review your notes and type them. The two assessors participating in listening sessions should compare notes and discuss what they have learned after each session. The assessor's reactions to and reflections on the listening sessions should be recorded as part of the data for the assessment. Resources for developing listening and note taking skills are included in the resources section of this guide.

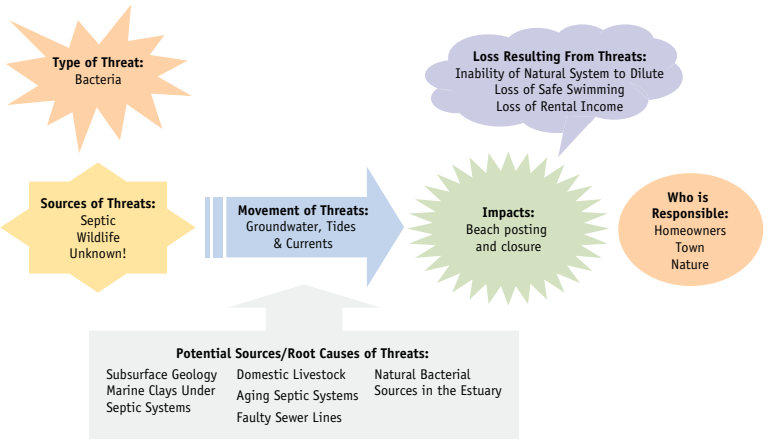
The four elements of the assessment phase are interdependent. Begin with your understanding of the situation, expand that to include the planning team and complete the assessment with stakeholder listening sessions.

3 Create and Synthesize Situation Maps that Capture the Diversity of Perspectives

Creating a situation map allows the part of your brain that produces insights and ideas an opportunity to look at the problem in new ways. The situation maps evolve to include your ideas, the ideas of the project planning team and the ideas of the stakeholders who participated in the listening sessions.

It may be useful to begin with two types of situation maps during the assessment phase. One map can be used to collect ideas about the nature of the problem. Who is affected? What are the causes, and what are the impacts of the problem? The second map can capture ideas about the scope of the solution. Who is responsible for solving the problem? What information is missing? What are the barriers to and incentives for a solution? The example situation map in Figure 7 synthesizes the ways people described the nature of threats associated with a specific pollution event. The ideas within the situation maps provide input to the final assessment matrix.

Figure 7. A Situation Map About Threats to Water at Goose Rocks Beach, Kennebunkport, Maine



4 Complete the Assessment Matrix to Organize Knowledge About the System Within Which the Collaborative Learning Project Will Occur

The Assessment Matrix is the final summary of the system prepared by the assessors and planning team at the conclusion of this phase. Making sense of qualitative data such as meeting minutes, flip charts and situation maps can be a daunting undertaking. This task benefits from the dialogue between the two assessors and the planning team. Each Collaborative Learning project will generate a unique assessment matrix.

Underlying the matrix are three key assumptions:

- Something of value is being lost or will be lost
- There are threats to what is valued
- Actions can be taken to protect what is valued

To create the matrix, review the minutes, notes and maps generated by the assessment. Use three different colored highlighters to code the data for the value, threat and protection themes described above. Start with simple lists and combine lists to form a matrix that captures the new understanding of the system. If you are more comfortable and inspired by the idea of a model or map of the final assessment, match the synthesis to a method that works best for your situation. The goal is to synthesize the perceptions of the planning team and the stakeholder group to create a more holistic picture of the problem situation.

The assessment matrix holds the key to evaluating the collaborative potential inherent in the situation. Shared values and shared perception of threats can be starting points for the Collaborative Learning process. Disparities about values and threats may indicate sources of conflict or information needs. The assessment brings the potential for both collaboration and conflict to the surface to inform the design of the Collaborative Learning process.

The information gained about actions to protect what is valued provides a systems understanding of the roles and responsibilities of the people whose knowledge, ideas and expertise contribute to solving a problem – the Kaleidoscope of Expertise.

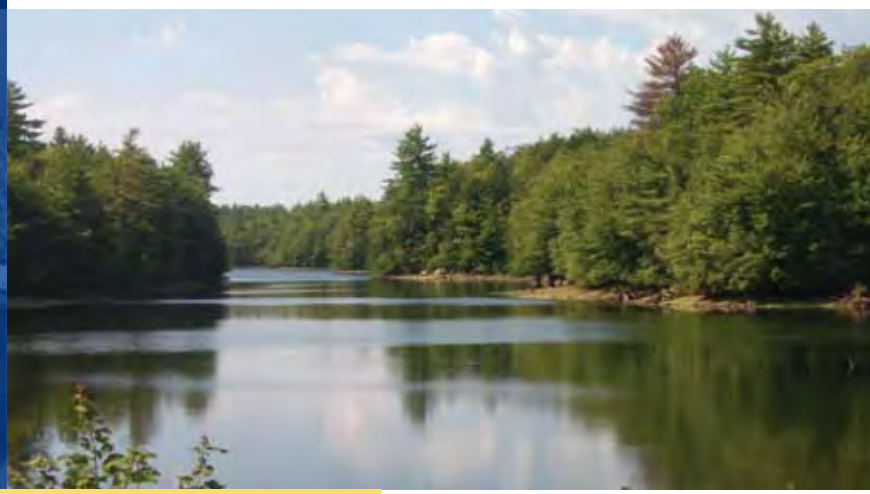
Table 2. Sample Assessment Matrix: The System for Protecting Water in Southern Maine

Roles in Place-based Water Protection System	Responsibilities in a Place-based Water Protection System	Institution, Agency or Group Responsibilities in a Place-based Water Protection System
Provide Public Infrastructure and for Public Safety	Infrastructure construction & maintenance Stormwater management Water Quality Protection	Municipal Wastewater Public Works Healthy Maine Beaches Program
Provide Public Drinking Water	Source water protection Water treatment Water delivery	Municipal Water District
Provide Planning Design and Oversight for Land Use	Comprehensive Planning Economic Development Planning	Municipal Planning Department Municipal Boards Regional Planning Commission
Enforcing Regulations	Local land use ordinances State regulations Federal regulation	Municipal Code Enforcement Officers Maine DEP
Science: Water Research & Monitoring	Conduct Watershed Surveys Prepare Watershed Management Plans Water Quality Monitoring	Research Institutions Wells NERR Municipal Water District
Land Conservation & Management	Conservation of land through purchase and easements Management of conserved lands linked to mission	Municipal Water District Rachel Carson Refuge Land Trusts
Education	Professional training Community Education K - 12 Education	Wells NERR Conservation Commissions Schools
Citizen & Business Watershed Stewardship and Advocacy	Advocacy for watersheds, and resources dependent upon clean water Stewardship of private lands Compliance with regulations/ordinances Participation in municipal government	Watershed and Community Groups Homeowner Associations Service on Municipal Boards Volunteer monitoring/ Citizen Science

(Adapted from Feurt, 2007)

Designing the Collaborative Learning Process

The assessment phase develops the blueprints for the Collaborative Learning Bridge. The design phase uses those blueprints for the construction of a sound bridge. The objectives of the design phase are to get the members of the Kaleidoscope of Expertise together to make progress on shared objectives and to develop activities that respect the knowledge, expertise and time constraints of everyone involved.



1 Confirm the Problem Statement and Purpose of the Process in the Invitation to Participate

Taking action to sustain nature's ability to supply clean water, healthy air quality and life support services is the overarching goal of ecosystem management. The task for Collaborative Learning is to convene groups of stakeholders who can take specific actions to make progress on this goal by improving the places where they live, work and play. The assessment phase was designed to identify the people with knowledge, expertise and the ability to act on an issue.

A clear statement of the problem and purpose for the process helps stakeholders determine if they want to participate. The problem and purpose should be clearly linked to the responsibilities and expertise of the stakeholders invited to attend. The outcome of a Collaborative Learning process is an action strategy developed by people who have the power to implement the actions. A stakeholder evaluating a commitment to participate will decide if the proposed event is aligned with their responsibilities for the issue, and if the activity is oriented to taking action to move forward to solve a problem.

THE DESIGN PHASE CONSISTS OF THREE ELEMENTS

1. Confirm the problem statement and purpose of the process
2. Design to engage the Kaleidoscope of Expertise
3. Develop facilitation and knowledge management skills

confirm
design
develop

2 Design to Engage the Kaleidoscope of Expertise

Develop your Collaborative Learning process using the strategies below to engage the Kaleidoscope of Expertise.

Tap the knowledge and expertise of participants to support systems thinking

Begin with a situation mapping activity to develop shared understanding of the issue and to reveal areas of agreement and disagreement. The information from the assessment phase will allow you to develop basic elements of a situation map you can use to start the dialogue. A variation on situation mapping, developed for the Protecting Our Children's Water project, is described in the next section. The goal, early in the process is to develop a holistic picture of the system within which the problem is embedded.

Engage participants in reflection about their work and provide them with ways to discuss ideas that improve their ability to work with the issue.

Develop an agenda that focuses on the needs of adult learners. Direct, active, problem-solving environments involve people in learning by doing. People like to participate in learning environments that engage them in active reflection about their work and ways to do their jobs better. Scientific information about the impacts of work practices and policies on natural systems can spark discussions about the need to adapt best practices to achieve desired outcomes. Field trips to demonstration sites, such as the University of New Hampshire's Stormwater Research Center, expose participants to new technologies and foster dialogue with people who have tried new approaches. The Protecting Our Children's Water project developed a series of field activities designed to allow participants to share place-based experiences across a range of professional practices.

Document and track the work of Collaborative Learning.

Show the evolution of the learning that takes place as a result of group interaction. Use flip charts to capture dialogue and display key ideas and themes to the group during the process. People need to see that ideas are captured and acknowledged, and they need a way to visualize the evolution of the dialogue as they move forward in their work. At the conclusion of a session review the work and summarize progress made. Group generated ideas, tasks and timelines fuel the process of ecosystem management. Synthesized minutes of the meeting should be prepared in draft, circulated to members for approval and finalized as a record of the process. Posting to an email list, forum or Blog facilitates access to the work of the group.

Connect the Collaborative Learning process to existing community goals.

People want to participate in activities that make a difference. Activities that sustain valuable natural assets of communities are important to elected officials, the public, community groups and businesses. A Collaborative Learning process with connections to goals identified as important to a community in comprehensive plans, open space plans or economic development plans benefits from documenting and publicizing the work that is accomplished.

If appropriate, a Collaborative Learning process should be linked to local government. If the project involves grant funds awarded to the town or commitment of town resources through staff participation in the process, elected officials should have the opportunity to review and endorse the activity. Provide clear accounting of the financial requirements or contributions associated with the project along with a timeline for accomplishing the project. Return to elected officials at the conclusion of a project to report on accomplishments and benefits to the town. In places where municipal business is broadcast over cable television, reporting to elected officials increases the visibility of the project and recognizes the work of participants to sustain resources important to the entire community.

3 Develop Facilitation and Knowledge Management Skills

There are two ways to bring Collaborative Learning skills to the practice of ecosystem management - develop and practice the skills yourself or include partners with these skills on your team. Interdisciplinary research teams are becoming standard practice in ecological research. Ecosystem management benefits from the same mindset. This guide is designed to help you make a realistic assessment of the time and expertise required to design and implement Collaborative Learning in support of ecosystem management.

Professional educators and outreach specialists working in ecosystem management are encouraged to experiment with the approach in situations where conflict is low and collaborative potential is high. The Protecting Our Children's Water project was such a case. The author of this guide learned the lessons of Collaborative Learning with a dog-eared copy of Daniels and Walker in hand and the motivation of a dissertation committee at her back. The resources section at the end of this guide provides key resources to support skill building and knowledge required for Collaborative Learning.

Collaborative Learning is a complex process of knowledge co-creation. Existing knowledge and expertise serves as a foundation for problem solving. Participants develop listening skills and are more productive when they learn to recognize the multiple lenses through which an issue can be viewed. The Kaleidoscope of Expertise becomes a rich source of creativity and innovation with expert and sensitive facilitation.

Researchers and Program Managers can include Collaborative Learning as a methodology to support project development, science translation and management plan implementation. A provocative rule of thumb to consider in these cases is the 50:50 rule. For ecosystem management projects, devote no more than 50% of the project effort and resources to scientifically describing the issue. Devote at least 50% of the project budget and work plan to a process like Collaborative Learning that focuses on the development and implementation of action strategies to achieve environmental outcomes associated with the issue. In the case of translation of recommendations from a completed research project or implementation of a management plan it may be appropriate to consider the Collaborative Learning process as a fundable stand-alone project. The 50:50 rule is a hard rule to accept given the uncertain nature of science. There will always be a need for more data, better models and continued field and lab experiments. Collaborative Learning and ecosystem management use the best available scientific information and engage the social capital inherent in communities, agencies and organizations in work to sustain and protect the ecosystem services provided by natural systems.

Implementation: Engaging the Kaleidoscope of Expertise

Lessons from the Protecting Our Children's Water Project

The twenty watershed council delegates assembled for the first workshop of the Protecting Our Children's Water project had an impressive 332 years of combined experience working with natural resource, water and municipal management issues. The challenge for the Collaborative Learning process was to engage the people with this expertise in dialogue about ways to implement a watershed management plan for the region.

Because the assessment phase included interviews with stakeholders, a preliminary understanding of existing knowledge, values and beliefs about water, and responsibilities for protecting water was a resource for the workshop. The delegates in the room represented the Kaleidoscope of Expertise with responsibilities for protecting water. These people shared values about the importance of water and knowledge about threats and protection strategies. The challenge for Collaborative Learning was to activate and engage the values and knowledge of the group.

Implementing Collaborative Learning requires ten essential elements. These process elements are linked to content elements to transform interactions within the group from the passive receiving of information from outside experts to sharing of expertise within the group. Outside information still plays a role, but time must always be built into the agenda for group members to discuss the meaning of the information for actions relevant to their work. Experience is the best teacher and the beauty of Collaborative Learning is its adaptability to match the expertise, mission and culture of the group you are working with.

"Why am I here and what do you want me to do?"

Elements 1, 2 address key principles of adult learning and should provide the answer to the question above within the first 20 minutes of the activity. An example from the opening session of the Protecting Our Children's Water Project appears below.

"Because you are responsible for some aspect of water management in your town we would like you to evaluate and prioritize a set of action items from the Little River Watershed Management Plan. The action items in the plan are proposed to reduce pollution in the watershed and protect water from further degradation. Today we will identify the action items that connect to work you are already doing. As a group we will determine which actions can be addressed realistically in the short term to improve water quality. We will tap your expertise to identify longer term actions that can improve water quality, resource needs to accomplish those actions and a timeline for future work together."

The Values Elicitation Exercise

This exercise addresses Elements 2, 3, 4, 5. The values elicitation exercise brings the knowledge and values of individual participants into conscious awareness as a resource for group problem solving. Presented at the beginning of a Collaborative Learning activity this exercise also works as an icebreaker.

Give each workshop participant a sheet of flip chart paper and three different colored markers. Participants write their name and title across the top of the page and use a green marker to answer the following question, "What is the importance and value of water to you?" Participants write their answers as free form lists or pictures in the center of the flip chart paper. When the group completes the first question, participants use the red marker to list things that threaten the values of water. Write the threats in a large ring at the outer edge of the paper, surrounding the values. As the final task, participants use the blue marker is to answer, "What actions do you take at work that protect water?" These responses are recorded in the space between the core values and the circle of threats. Each group member can then introduce themselves and describe an "aha moment" or highlight associated with completing the activity. Individual pages are taped to the tables in front of each participant.

The values elicitation exercise can be adapted to suit the purpose of any Collaborative Learning activity. The assessment conducted for the project identifies stakeholder knowledge and values. This activity taps that resource to bring values and perception of threats to the surface and begins to develop a shared picture of the situation. This activity also reinforces connections to work. This approach differs from traditional approaches that describe the structure and function of a pristine watershed and how humans degrade that system. This exercise focuses on values and responsibility for water.

Create a Situation Map to Build Shared Understanding (Element 4)

Use the same technique for building a situation map described on pg. 9. Basic elements of the map developed during the assessment can be a starting point to speed the process. Ideas from the values elicitation exercise can be added to the situation map. Use participants' exact words to create the map and ask participants to review the final map during a break to make sure that key ideas are represented. A simple situation map is shown in Figure 8.

Figure 8. Situation Map for Protecting Our Children's Water

Individual Issue of Concern (Element 5)

Sample Individual Concerns Worksheet Protecting Our Children's Water Workshop

Name_____

1. What part of the Situation Map are you involved with in your work?
2. What are your specific concerns and interests about these issues?
3. What other parts of the situation must be considered when designing improvements to this part of the map?
4. What people or views must be considered in designing improvements related to this issue or area?

After a break when people have had time to review the situation map, ask each participant to complete an individual worksheet with their concerns related to the situation.

Small Group Evaluation of Issues of Concern and Improvements Worksheet (Elements 4, 6 & 7)

Improvements Worksheet for Small Group

1. How can management be improved? Describe the outcome of this action.
2. Why is the outcome desirable?
3. How is this outcome feasible? Who would be responsible for implementing and funding the improvement?
4. What barriers are currently preventing this outcome? How would you overcome the barriers?
5. How is this improvement connected to other parts of the situation map?

After people capture their ideas and reactions to the situation map on an individual worksheet. People meet in small groups to discuss individual concerns and brainstorm a list of potential improvements that can be made to achieve desired outcomes. This activity can include evaluation of action items from a pre-existing plan or generation of new action items. The questions on the worksheet are designed to stimulate dialogue.

Full Group Presentation of Improvement Worksheets and Development of Action Strategy (Elements 8, 9, & 10)

The worksheets completed in small groups are the raw material for developing the action strategy. The three most important considerations in developing an action strategy that supports ecosystem management are time, outcomes and accountability. Some rules of thumb…

- The Collaborative Learning process must include adequate time for dialogue and development of action items linked to outcomes. At least half of the time in the agenda should be allotted for discussion.
- The time to implement action items must be realistic and based upon resources and capacity. If resources and capacity don't exist, create an action item to secure resources and build capacity. If the person with expertise in implementing an action item is not in the room defer decisions on that item until that expertise can be accessed.
- Be honest about the time scale for outcomes to manifest as a result of actions taken. The Protecting Our Children's Water project timescale is 2005-2025.
- Outcomes must be feasible, measurable and attributable to the actions taken. There are always actions that can be taken to improve some aspect of a complex situation. Focus on improvements that allow a group to develop a track record of success.
- Develop a mechanism for accountability. The next section of this guide provides ideas for accountability, adaptive management and evaluation.

1. Provide orientation to: purpose, process, outcome
2. Establish relevance to work
3. Connect to values
4. Build shared understanding
5. Generate individual issues of concern
6. Evaluate issues of concern – small group
7. Develop improvement analysis – small group
8. Share improvements
9. Develop action strategy – Who will do what and when?
10. Develop accountability

Evaluation Connects Collaborative Learning to Goals of Ecosystem Management

This guide presents Collaborative Learning as an expert practice for designing, implementing and evaluating the dialogues that support ecosystem management. Collaborative Learning can be used to build research teams, management teams and communities of practice, and to engage those teams in work focused on shared goals. The work of collaborative teams and the action strategies they develop must be linked to the fundamental goal of ecosystem management - sustaining the natural systems that provide clean water, healthy air quality and life support for all living things. Taking action to sustain natural systems and improve the places where people live, work and play is the outcome of the Collaborative Learning process. Determining if those actions are moving toward the collaboratively developed vision of the group and the goals of ecosystem management is the fundamental challenge of evaluation.

Evaluation skills are hard wired in our brains. Evaluation is learning what works, recognizing when something isn't working and figuring out a new course of action that gets us where we want to go. Evaluation works best when actions can be compared against a baseline or starting condition and measured with a goal or outcome in mind. Evaluating effectiveness includes assessing the time, resources and effort that go into producing desired outcomes and making progress toward shared goals.

The goal of ecosystem management is to sustain ecosystem structure and function by integrating ecological, socioeconomic and institutional perspectives. Collaborative Learning applied at a scale to sustain the places where people live, work and play brings the goals of ecosystem management into focus so that people can take actions to improve the places they are most connected to through livelihood, family and experience.

Evaluation Pervades the Collaborative Learning Process

Understand that evaluation is not an end of process activity. Evaluation is a continuous process of attending to, documenting and reflecting on the goals and objectives of each phase of a Collaborative Learning process. Individuals involved with Collaborative Learning evaluate their participation in the process and their achievement of personal action items as part of a larger strategy generated by the group. Planning team members evaluate both the design and implementation of the process and the progress of the group toward shared goals. Participants in an on-going Collaborative Learning process can develop the evaluation strategy that matches the needs and scope of the project. Evaluation of Collaborative Learning is analogous to adaptive ecosystem management in that projects are designed with the mindset that each activity is an experiment in social learning. Evaluation measures the outcomes of each activity against the objectives and goals of the project, providing course corrections for continued improvement.

evaluate

IS COLLABORATIVE LEARNING WORTH THE EFFORT?

Collaborative Learning is one tool among many for accomplishing the goals of ecosystem management. It is an effective method for improving the capacity of organizations to implement ecosystem management through stakeholder engagement. Implementing the first Collaborative Learning process is resource intensive and difficult, but it gets easier. With practice, the key elements of the process become instinctive. Knowledge about the social system within which ecosystem management occurs and skill for facilitating collaborative process are not part of the education of many scientists and resource managers. I would be less than honest if I didn't admit that after facilitating an exhausting workshop or contentious planning meeting, I experience a longing for the simplicity of counting species in a salt marsh vegetation transect. Scientific knowledge can carry us only so far on the path to sustainable practices. Collaborative Learning is a way to bring science into the policy and management arena and put that science to work.

1 Tracking Improvement Toward Ecosystem Management Goals

The goal of Collaborative Learning is improvement in a situation. Participants generate action strategies that they think will result in improvement and take ownership of actions that they have the power to implement. Collectively, the improvements move toward a longer-term outcome that is recognized by the group. Tracking movement toward longer-term outcomes is part of the evaluation phase of Collaborative Learning.

Collaborative Learning groups can adopt an existing set of outcomes and standards and orient their action strategy toward those goals. The Protecting Our Children's Water project used a completed watershed management plan to select action items aligned with short-term outcomes. The assembled Kaleidoscope of Expertise evaluated the feasibility of each action item. Discussion among planners, public works directors and code enforcement officers from neighboring towns provided a reality check for scaling the general action items proposed in the plan down to specific implementable and measurable action.

Overarching Goal:

Protecting Our Children's Water

Long-term Goal:

Protecting riparian buffers to improve water quality

Watershed Management Plan Action Item:

Reduce ATV impact in headwater streams

Action Items From Collaborative Learning Process:

- Photograph damage
- Explain extent of problem to elected officials to gain their support
- Site visit with local and state policy makers
- Secure DEP commitment to document extent of damage
- Investigate targeted enforcement with local police and game wardens
- Seek funding to explore mitigation options with partners

2 Documenting Learning, Conflicts & Ideas Through Meeting Minutes

Meeting minutes are a resource for measuring the social learning that occurs during Collaborative Learning. Minutes also document sources of conflict, innovative ideas and anticipated barriers to progress.

Minutes of a Collaborative Learning process should incorporate flip chart notes, situation maps and individual worksheets such as the Values Elicitation Exercise and Themes of Concern. Evaluation requires that the minutes documenting the meeting are reviewed and approved by participants.

Formal evaluation for research or legal purposes may require video recording and transcription of meeting minutes. In most cases, meeting minutes submitted to participants for review and correction and archived in a stable accessible format serve the needs of Collaborative Learning.

3 Soliciting Feedback Through Participant Surveys & Dialogue

Participants are a critical source for evaluating the process of Collaborative Learning and progress toward shared goals. Written surveys and formal interviews can require agency approval and design assistance from a social scientist. If your access to such resources is limited, post-workshop evaluations, follow-up phone calls and chatting over a cup of coffee are effective ways to learn what participants think about a process.

Breakfast at the Cockpit Café in Sanford, Maine became a favorite way to meet and discuss the progress of watershed councils during the Protecting Our Children's Water project. Informal dialogues at a participant's workplace or walking in places where action plans are based provide powerful ways to develop an understanding of the reactions of stakeholders and to solicit feedback to improve progress. Take a hard look at your approach to working with stakeholders. How much time do you spend with email contacts, researching on-line and talking with people in your own organization? Compare that to the amount of time you spend face to face with stakeholders from the groups you collaborate with. Collaborative Learning benefits from knowledge that you as a process designer and facilitator develop about the work environment and places of importance to the people involved in the process.

4 Accountability

Ecosystem management must be accountable to governing bodies elected to represent the interests of the people. In the case of the Protecting Our Children's Water project, elected officials serving on Boards of Selectmen and Town Councils were the primary governing bodies responsible for overseeing policies about land use that impacted water resources. Each town governing body was approached before the project began.

After viewing a 10-minute presentation about the project, elected officials from each watershed town voted to support participation of municipal staff for an experimental period of four months. Elected officials wanted information on cost to the town, time required away from employee's regular duties, and the mechanism for reporting outcomes of the work. Officials wanted to be sure that participation on the watershed council would not obligate the town for unplanned expenditures. Participation in the first round of Collaborative Learning events required 32 hours of staff time, all of which were linked to municipal goals for clean water described in town Comprehensive Plans.

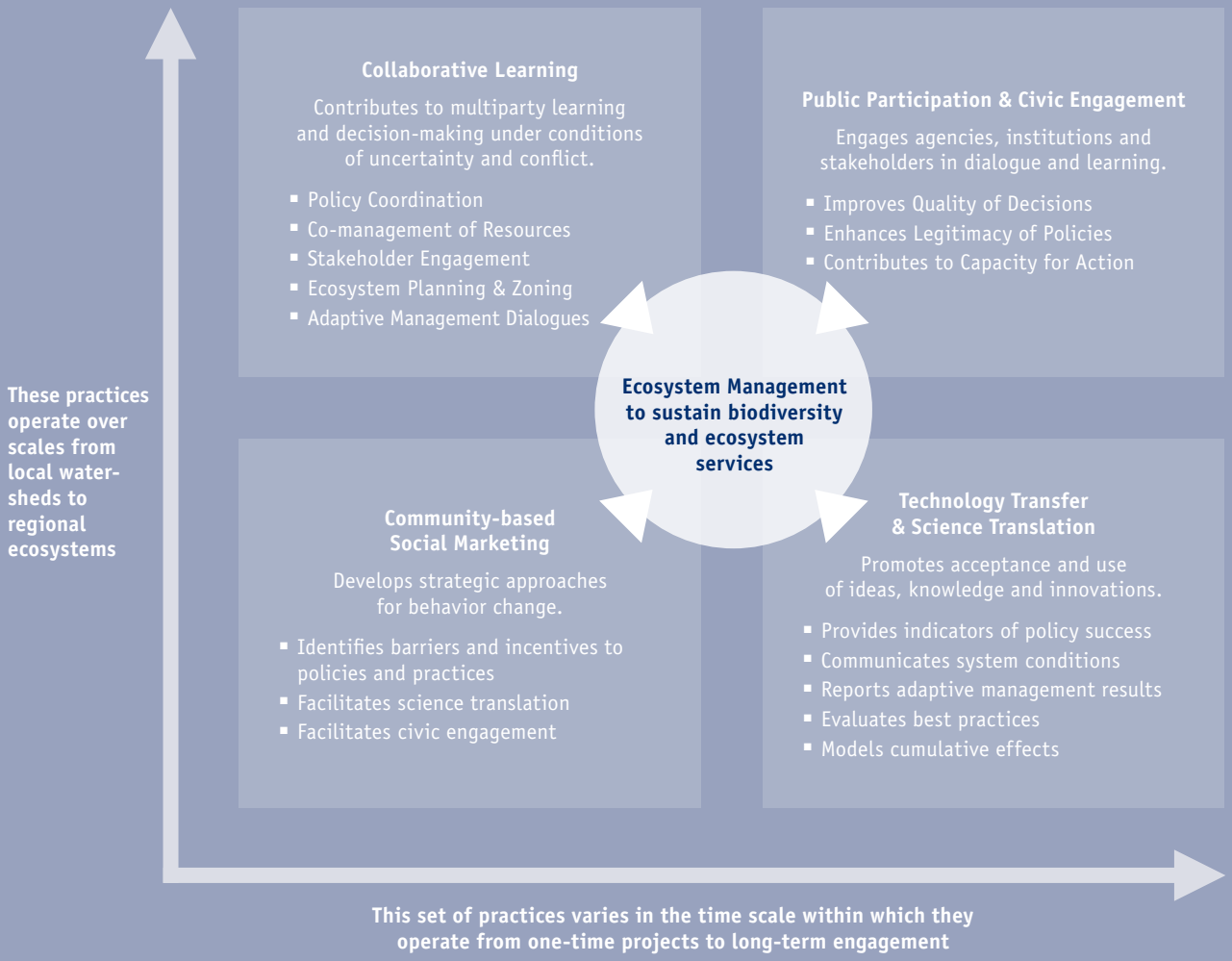
When the four-month experimental phase ended, participants indicated on written surveys and during discussion, a willingness to continue to work as a watershed council. Reporting to elected officials at the end of the experimental phase was part of the evaluation. Elected officials received a one-page summary of the project, viewed a brief presentation, and discussed extending the commitment to participate. In each of the seven towns participating in Protecting Our Children's Water, elected officials voted unanimously to continue town participation on the watershed councils.

The Landscape of Environmental Communication

This guide introduces Collaborative Learning as one tool for structuring the complex dialogues that drive ecosystem management. Collaborative Learning is part of the rapidly growing field of Environmental Communication. This field encompasses scholarly research and practical applications illuminating the ways society understands and responds to environmental messages and events. Environmental Communication marries participatory and collaborative approaches with traditional environmental education and interpretation, taking the most effective practices and principles from the craft and framing them within theories of learning and behavior. This rich interdisciplinary field addresses the communication of science and environmental risk, multi-stakeholder collaboration, public participation in environmental decision-making, conflict resolution, social marketing, environmental journalism, the representation of nature in popular culture, and environmental advocacy campaigns (Cox, 2006). These approaches provide tools to alert, educate, persuade, mobilize and engage people in ecosystem management.

Three approaches to Environmental Communication are highlighted here for comparison with Collaborative Learning. Because each approach is based upon different theoretical and applied traditions, they vary in their orientation to learning, behavior change, and communication. Each of these approaches, along with Collaborative Learning, contributes to achieving the goals of ecosystem management.

Figure 9. Environmental Communication Contributions to Ecosystem Management



Public Participation & Civic Engagement

The history of public participation has strong roots in the New England town meeting. Public participation in federal environmental policy increased with the passage of the National Environmental Policy Act (NEPA) in 1969.

The relationship among federal environmental agencies and public participation has evolved through a series of laws, policies, and on the ground experience during the past four decades. Political theorist Kai Lee (1993) captured the link between public participation, which he refers to as civic engagement, and ecosystem management. He uses the metaphor of the compass and gyroscope. Science is the compass that guides ecosystem management toward goals of sustaining ecosystem structure and function. Civic engagement is the gyroscope providing course corrections related to societal goals and priorities. Public participation consists of a rich collection of approaches aimed at improving the quality and legitimacy of decisions and increasing the capacity of federal agencies and their constituencies to engage in long-term policy dialogues. The Collaborative Learning process is one technique that can be adapted to facilitate public participation (NRC, 2008).

engagement

Community-based Social Marketing (CBSM)

Drawing from theory and practices associated with social psychology and marketing, Community-based Social Marketing can be applied to foster practices that support ecosystem management objectives.

CBSM uses a rigorous four-step method to design and implement behavior change projects (McKenzie-Mohr & Smith 1999). The key to success with this method is preliminary research to identify the barriers and benefits of the desired action. Combining this knowledge with behavior change tools results in a strategy designed to reduce barriers and increase benefits. The strategy for behavior change is tested and improved through piloting. Evaluation is a critical step that documents behavior change effectiveness by comparing project outcomes with baseline conditions before the project.

CBSM is frequently applied to implement local projects like riparian buffer restoration. Such projects support the larger goals of ecosystem management. CBSM can be applied at a broader scale to identify and overcome barriers to building capacity for ecosystem management. In the Protecting Our Children's Water project, elements of CBSM supported the development of Watershed Councils. The assessment phase of Collaborative Learning identified barriers to Watershed Management Plan implementation and cooperation across institutional and political boundaries. The Collaborative Learning process was designed to secure buy-in by local elected officials. The project connected disparate professional disciplines and organizational missions under the umbrella of Protecting Our Children's Water. These steps reduced barriers and created incentives for participation in the Watershed Council.

Technology Transfer & Science Translation

The theory of the diffusion of innovations eloquently explains how new ideas move through society. The application of scientific findings to the practice of ecosystem management is influenced by the same principles that explain how the latest cell phone technology moves through the marketplace (Rogers, 1995).

The speed of science translation and technology transfer is influenced by a number of factors. Adopters of new information and technologies must perceive an advantage to the new idea. How will the idea help get the job done? New ideas that are consistent with adopter values, experiences and needs are picked up faster. This is why linking adopter values, experiences and needs to the process of technology development and the design of management relevant research is vital. Simplifying complex practices allows people to try new methods. This guide aims to simplify the Collaborative Learning process to encourage practitioners to experiment with the approach and facilitate its adoption as a tool for ecosystem management. The ability to observe the results of applying new ideas stimulates discussion and speeds the adoption of ideas through visibility.

The *delivery* of information model that underlies the terms technology transfer and science translation can be transformed from one-way communication to a learning network that supports ecosystem management by using Collaborative Learning. The process of Collaborative Learning is the bridge that connects the science and technology generating system to the management system where the new information and tools can be put to work.

Resources for Developing Skills for Collaborative Learning

This guide adapts the work of Steven Daniels and Gregg Walker presented in their book, *Working Through Environmental Conflict: The Collaborative Learning Approach.* This is a good resource for understanding the theory and principles underlying Collaborative Learning, as well as being an invaluable guide to practices and techniques. Other resources discovered during the development of the Protecting Our Children's Water project are collected here.

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A DOZEN KNOWLEDGE-EXPANDING SITES

The Environmental Communication Network: www.esf.edu/ecn/

The Society for Organizational Learning: www.solonline.org/organizational_overview/

National Extension Water Outreach Education Facilitating Access to Resources and Best Education Practices: http://wateroutreach.uwex.edu/

Foundations of Success – Improving the Practice of Conservation through Learning and Adaptive Management: www.fosonline.org/About_FOS.cfm

The Ecosystem Management Initiative: www.snre.umich.edu/ecomgt/aboutemi.htm

The Center for Watershed Protection: www.cwp.org/

The Local Government Environmental Assistance Network: www.lgean.org

The Society for Applied Anthropology - Environmental Anthropology: www.sfaa.net/eap/abouteap.html

Fostering Sustainable Behavior through Community-Based Social Marketing: www.cbsm.com/

Nonpoint Education for Municipal Officials (NEMO): http://nemonet.uconn.edu/

ICLEI - Local Governments for Sustainability Water Campaign: www.iclei.org/index.php?id=799

The Groundwater Foundation: www.groundwater.org/index.html

UNH/NOAA Cooperative Institute for Coastal and Estuarine Environmental Technology (CICEET). CICEET uses collaborative research principles to foster the development of coastal environmental technologies: ciceet.unh.edu. Funding and support for this report and the Protecting our Children's Water project was provided by CICEET, the Cooperative Institute for Coastal and Estuarine Environmental Technology (CICEET). CICEET works with the National Estuarine Research Reserve System to develop, test, and demonstrate technology that can be applied to improve coastal resource management in a time of climate change and intensifying development. CICEET is a partnership of the National Oceanic and Atmospheric Administration and the University of New Hampshire.

Recognizing Ecosystem Management

This guide captures lessons learned from the practice of community-based ecosystem management in southern Maine. Ecosystem management becomes reality in local communities. Here town employees, members of volunteer boards, community groups, and community-oriented members of state and federal agencies combine forces to make the places where they live, work and play noticeably better for people today and for future generations. This Kaleidoscope of Expertise is the social capital for ecosystem management. The Kaleidoscope of Expertise consists of people whose collective knowledge, experience and actions are a force for protecting and sustaining nature's ability to provide clean, abundant water.

Land use creates local water conditions. Evaluating and designing land use practices that protect our children's water can benefit from the dialogues and problem solving approach of Collaborative Learning. Recognizing ecosystem management at the local scale requires expanding traditional ideas about responsibility for sustaining natural systems. Collaborative Learning can transform the relationships among the groups of people working from different disciplines and approaches by orienting people toward shared values and goals. The communities, groups and agencies recognized below contributed to this guide through their participation in the Protecting Our Children's Water project. The work of these people and their willingness to engage in this experiment in collaboration made this Guide a reality.

The Collaborative Learning Guide for Ecosystem Management is dedicated to the people representing the groups listed below:

Town Managers, Town Planners, Boards of Selectman, Town Councils, Town Planners, Code Enforcement Officers, Public Works Directors, Town Engineers, Highway Supervisors and members of Planning Boards, Open Space Committees and Conservation Commissions in the Maine towns of: Biddeford, Eliot, Kennebunk, Kennebunkport, Kittery, Sanford, South Berwick, Wells, and York.

The Kennebunk, Kennebunkport and Wells Water District

The York Water District

The Kittery Water District

The York Rivers Association

The Spruce Creek Association

The Kennebunk River Action Coalition

The Kennebunk River Committee

The Cape Neddick Watershed Association

The Mount Agamenticus to the Sea Conservation Coalition

Maine Nonpoint Education for Municipal Officials

Maine Department of Environmental Protection

Maine Coastal Program

Maine Drinking Water Program

Southern Maine Regional Planning Commission

Land Trusts serving southern Maine

Wells National Estuarine Research Reserve

The University of New England Department of Environmental Studies

Antioch New England Graduate School Department of Environmental Studies

Rachel Carson National Wildlife Refuge

Maine Sea Grant

New Hampshire Sea Grant

Great Bay National Estuarine Research Reserve

Casco Bay Estuary Partnership

New Hampshire Estuary Program

The Coastal Training Program Coordinators of the National Estuarine Research Reserve System- the architects of collaborative regional ecosystem management.

The Coastal Training Program of the Wells National Estuarine Research Reserve and the Center for Sustainable Communities of the University of New England are committed to building the capacity of groups, organizations and institutions to use Collaborative Learning to support ecosystem management that leads to positive environmental outcomes. Please contact Dr. Christine Feurt to learn more about capacity building and training opportunities.

Please direct comments about this guide and your experiences with Collaborative Learning for ecosystem management to:

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