

Chapter 3 - CEM Methodology

The methodology behind CEM is quite simple. There is a diverse group of decision-makers, planners and other key personnel that could benefit from direct interaction with and the technical assistance of people with environmental expertise. (Bringing together a CEM team consisting of individuals with varied environmental expertise would provide a large amount of “environmental capital” to work with.) The materials provided by CEM and other related programs and initiatives can act as a framework or guide for this interaction. Ultimately, it is the interaction between these two groups that is critically important. Whether they choose to use CEM or some other mechanism to make “better” natural resource and/or water quality decisions is of lesser importance.

3.1 Environmental Issues and Resources

There is little disagreement that sprawl, degrading water/air quality and increased consumption of natural resources have a negative impact to our quality of life. Many of these issues can only be addressed at the local-level. Without effective locally led programs and initiatives these concerns will surely worsen. CEM and other related initiatives could be instrumental in examining, controlling and possibly reversing these trends.

There are many qualified and highly skilled agencies, companies and individuals working toward natural resource and water quality protection. The entire CEM initiative is indebted to many of these individuals and their efforts. The ideas incorporated into CEM have been gleaned from their efforts. CEM provides contact information about these resources and encourages their use.

CEM is by no means the only initiative that addresses environmental topics. We have tried to make our program a “one-stop” center for many of the environmental issues communities face. By doing this, we hope to send a clear and consistent message to local communities that there are many strategies and options for the handling of environmental issues. If a community is more comfortable working with other related materials, projects or programs we encourage and welcome their use as part of any type of planning process or a CEM initiative.

It is important to remember that CEM is not a faultfinding exercise. It's intent is not political, regulatory or fragmentary. CEM should be used to enhance locally led efforts and have an overall positive impact in the community. Working together in an open and honest setting is critical to the success of any community-based project or initiative.

3.2 CEM and the Watershed Approach

CEM addresses non-point source pollution and other related environmental issues and the local community level. Some related programs like New York State's AEM (Agricultural Environmental Management) and EPA's NPDES Storm Water (MS4 Phase 2 Stormwater Program) address specific non-point source issues directly. Any initiative that addresses non-point source pollution is typically viewed as watershed-based initiative. Watersheds being the overall collector for non-point source pollution in a particular area. Everyone lives in a watershed regardless of his or her municipal, county, state or national boundaries.

Watersheds have a variety of hydrological and ecological functions. In short, watershed function is about how water moves, reacts and interacts with the physical environment. Since life on this planet relies on water, watersheds and their function impact all ecosystems and ultimately every living creature. Since almost all of our activities impact or alter the physical environment they also impact watershed function. What we call watershed management or watershed planning describes our activities aimed at understanding, controlling, enhancing and/or restoring watershed function.

Watershed planning can take many different forms. Any attempt to control, limit or understand our activities and their impacts could be part of a watershed plan. Other planning efforts and plans, including master, flood mitigation, stormwater, land use, agricultural, zoning, economic development, waterfront, drainage, etc., examine pieces that would be considered under a "full" watershed planning effort. Often these pieces are often examined separately because of existing planning structures and the sheer complexity of trying to examine all of these issues at once. Each community, it seems, has different boards, agencies and organizations setup to handle specific issues.

CEM acknowledges this existing community structure. It works with and within these pieces, but its overall premise remains holistic. Every question, strategy and management option recommended by CEM has been carefully chosen. They have all been chosen in a way that will hopefully guide and assist people with understanding and lowering our impact on natural resources and water quality.

Four informational pieces on the watershed approach are provided next:

3.2.1 Watershed Scoping Tool

3.2.2 Prioritizing Watersheds

3.2.3 Catskill Creek Watershed Strategy

3.2.4 Updating County Water Quality Strategies

Assessment Tool for Identifying and Prioritizing Natural Resource Concerns within a Watershed

Introduction

The attached watershed natural resources assessment tool provides worksheets for Local Working Groups and County Water Quality Coordinating Committees to use to identify priority natural resource concerns on a watershed basis. This assessment tool addresses the entire resource base (soil, air, water, plants and animals) for each predominant land use within a watershed.

The assessment tool can be used on a county (watershed) or community (sub-watershed) basis to identify geographic areas of concern and existing or potential natural resource impacts that need addressing. This assessment provides the foundation for a comprehensive evaluation of the condition of each watershed's natural resource base and thus can become the platform for making decisions about local priorities or policies for local delivery of conservation programs to landowners and communities within a watershed.

Watershed _____

HUC # _____

Date _____

WORKSHEET FOR IDENTIFYING NATURAL RESOURCE CONCERNS

IMPAIRMENTS / IMPACTS ¹	Significance Factors ²			COMMENTS
	LEVEL OF CONCERN (H, M or L)	EXTENT OF IMPACT (H, M or L)	RESOLV-ABILITY (H, M or L)	
Floodplains				
encroachment into flood plain;				
increased threat of flooding (changes in land use & increase in % impervious areas);				
loss of flood plain functions (flood storage);				
changes in flooding frequency;				
other (list).				
River & Stream Corridors				
loss/degradation of riparian buffers;				
excessive stream bank erosion;				
barriers to fish movement(dams, culverts);				
altered or unstable stream channel(channel deeply incised);				
change in stream characteristics (riffle embeddedness , loss of in-stream fish cover, loss of stream invertebrates) ;				
loss of sediment transport capacity(braiding);				
withdraws affecting low flow habitat;				
increased stream temperatures;				
uncontrolled livestock access to streams;				
litter/debris along stream/riverbank or in channel;				
lack of public access for water based recreational opportunities;				
other (list).				

¹ Includes impacts to soil, water, air, plants, and animal resources for each land use along with economic and social considerations

² See attachment 1 for explanation of the significance factors

Wetlands (freshwater & tidal)				
degradation/loss of wetlands from filling;				
encroachment from incompatible land uses;				
loss of hydrology from draining or modification of adjacent uplands;				
fragmentation of landscape (loss of connectivity);				
invasive exotic plants (e.g. purple loosestrife);				
other (list).				
Lakes & Reservoirs				
eutrophication;				
shoreline erosion;				
beach closures;				
failing onsite systems;				
loss of recreational opportunities;				
other (list)				
Fish and Wildlife Habitat				
loss of / fragmentation of habitat (loss of connectivity);				
loss of native species;				
loss of biodiversity;				
increase in invasive, exotic and/or nuisance species;				
loss or reduction of threatened or endangered species;				
loss of sustainable cold or warm water fisheries;				
restricted passage that limits migration/movement of fish / aquatic species;				
other (list).				

Agricultural Land				
loss of prime, important, and unique farm land (critical mass concerns);				
urban/suburban infringement on farm land (neighbor relations, sound agricultural practices concerns);				
increasing numbers of CAFOs within watershed with inadequate land resource base;				
marginal farm profitability;				
inadequate water supply for farm needs;				
other (list).				
Farmstead				
odors from livestock operations (neighbor complaints);				
barnyards/feedlots close proximity to stream;				
lack of emergency spill response plans on farm (for manure, pesticides, petroleum products, etc.);				
poor herd health;				
inadequate pesticide mixing facilities.				
Cropland				
decline in soil quality;				
airborne chemical drift;				
pesticides being applied without regard to leaching or runoff potential;				
cropland erosion;				
excess nutrients;				
subsidence (oxidation of organic soil);				
application of bio-solids on cropland.				
Hayland/Pasture				
poor quality hayland or pastures (unmanaged sys.) ;				
lack of adequate livestock watering facilities.				

<u>Forest Land</u>				
loss of high value species;				
poor growth;				
lack of quality;				
disease and insect pests;				
encroachment/forest fragmentation;				
increased runoff from harvested areas;				
erosion from skid trails, landings, and logging roads;				
aesthetics of timber harvesting activities;				
overuse – recreation;				
loss of prime and important forest lands;				
loss of biodiversity;				
other (list).				
<u>Mined Land</u>				
visual blight/incompatible land uses;				
changes to surface and subsurface flow characteristics;				
surface water/ groundwater impacts;				
other (list).				
<u>Open Space / Recreation Land</u>				
loss of prime, important and unique farmland to development;				
loss of special viewsapes;				
loss of culturally and historically significant areas;				
limited land-based or water-based recreational opportunities;				
loss of old growth forests;				
reduction in rare or unique habitat (Pine Barrens, bogs);				
other (list).				

Suburban / Urban Lands				
lack of town or village comprehensive land use plan that addresses natural resource protection and enhancement needs;				
lack of safe disposal/recycling of waste;				
inadequately sited salt & sand storage facilities;				
inadequate water supplies (rural fire protection or drinking water concerns);				
landfill leachate enters ground or surface water;				
inadequate plant cover (shade tree / urban forestry concerns);				
soils contaminated from heavy metals/toxins;				
odors from landfills / sewage treatment plants;				
other (list).				
Urban Runoff				
soil erosion from disturbed areas;				
roadbank erosion;				
increase in storm water runoff (due to increasing % impervious areas);				
inadequate storm water management controls;				
lack of O&M existing storm water BMPs;				
inadequate site design requirements for developments;				
urbanized streams;				
combined sewer overflows to surface waters;				
inadequate street maintenance (street sweeping, clean out of catch basins);				
inadequate storm water management;				
other (list).				
On-site Wastewater Treatment Systems				
systems failing due to improper siting, design or installation or due to a lack of maintenance;				
lack of access to or limited capacity of local waste treatment facilities results in illegal dumping of septage				
other (list).				

Drinking Water Sources				
public and/or private drinking water source contaminated;				
source water assessment completed, source(spring, well, river lake or reservoir) susceptible to possible contamination;				
inadequate or nonexistent local source water protection program;				
other (list).				
Coastal/Marine Resources				
nonpoint source pollution from marina operations				
deteriorating waterfronts;				
coastal dunes / shoreline erosion;				
direct discharges (direct dumping or pipeline discharges);				
beach closures;				
shellfish contamination;				
brown/red tides;				
hypoxia;				
thermal pollution;				
marine/beach debris;				
other (list).				

SIGNIFICANCE FACTORS FOR ASSESSING THE CONDITION OF NATURAL RESOURCES WITHIN A WATERSHED

Level of Concern	Extent of Impact	Resolvability
<ul style="list-style-type: none"> • degree of problem identification & documentation • level of public concern / support for action • potential for offsite impact • value of the resource to be protected • public health or safety concern 	<ul style="list-style-type: none"> • Watershed-wide, municipality-wide, or localized • % farms or landuse category impacted • severity of natural resource or water quality impact • degree of threat or sensitivity (vulnerability) of resource 	<ul style="list-style-type: none"> • level of understanding of extent of problem, cause & effect relationships • degree of complexity • availability of programs to address • institutional constraints • local capacity to address • available technologies and methodologies • cost effectiveness (benefit/cost ratio) • level of management required • history of O&M on previously applied BMPs/conservation practice

PRIORITIZING WATERSHEDS FOR LOCALLY LED CONSERVATION

Potential level of Concern				
Watershed/Waterbody Factors	<u>low</u> 1	<u>2</u>	<u>3</u>	<u>high</u> 4
Water use classification (highest & best use)	D	C	B, C (T)	A, AA
Severity of water quality impact on classified use	threatened	stressed	impaired	precluded
Threat to public health	no present restriction on use	swimming temporarily banned, documented beach closures or boil water advisories	fishing advisory exists or intermittent presence of toxics affect use as public water supply	swimming, fishing and/or use as public water supply banned
Waterbody priority	not identified in County Water Quality Strategy	waterbody of local concern identified in county water quality strategy	filtered surface water supply or on DEC's Priority Waterbody List	unfiltered surface water supply, well head protection area or primary or principal aquifer
Potential economic impact if not addressed	no significant impact	local impact	regional or multi-county impact	state or multi-state impact
Public access factor	no public access	limited access for public use	moderate access for public use	extensive access for public use
Size of impacted waterbody	less than 1 miles stream; less than 10 acre lake/bay/estuary	between 1 and 5 miles streams; between 10 and 100 acres lake/bay/estuary	more than 5 miles but less than 10 miles stream; more than 100 acres but less than 1000 acres lake/bay/estuary	more than 10 miles stream; more than 1000 acre lake/bay/estuary

PRIORITIZING WATERSHEDS (con't.)

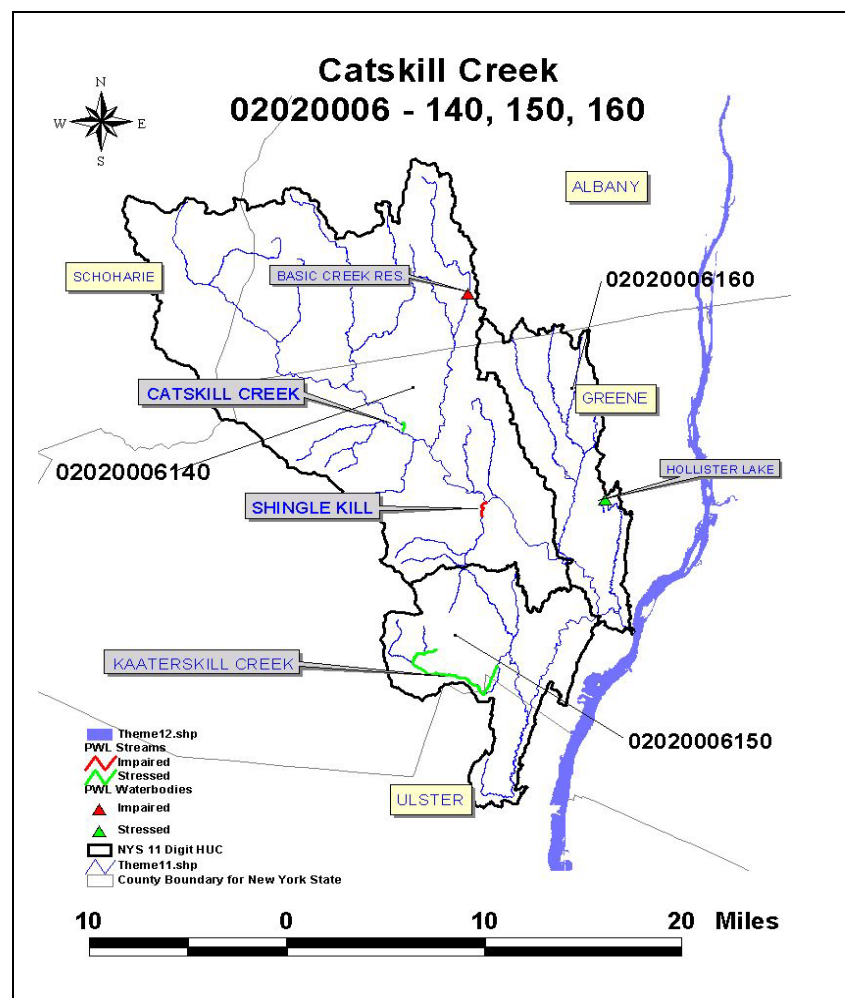
Potential Level of Concern				
Prior NPS planning efforts in the watershed	no previous studies or analysis have been conducted in the watershed	simple watershed analysis conducted by interdisciplinary team	river basin or similar studies performed or watershed water quality plan exists	comprehensive watershed plan recently prepared; implementation priorities clearly defined
Pollutant being addressed	pollutant not listed on PWL data sheet	pollutant not verified but suspected	secondary pollutant causing impact	primary pollutant causing impact
Level of documentation of NPS pollutant or sources	none	poor	fair	good
Federal, State or local NPS programs affecting land use activities in the watershed	none	local ordinance(s) addressing nps concerns source water assessment- low susceptibility to contamination	waterfront revitalization plan(s) 303d listed waterbody source water assessment- medium susceptibility	source water assessment- high susceptibility watershed rules & regulations TMDL being implemented
Number of resource concerns in the watershed <i>(i.e. flood control, farmland protection, rare and endangered species protection, wildlife habitat mgmt)</i>	one resource concern being addressed	two	three	four or more resource concerns being addressed

CATSKILL CREEK WATERSHED RESTORATION & PROTECTION STRATEGY

11 DIGIT HUCs #: 02020006-140, 02020006-150 & 02020006-160

WATERSHED AT A GLANCE

Sub-Basin:	Lower Hudson River
Major Waterbodies:	Basic Cr. Reservoir, Catskill , Potic and Kaaterskill Creek
Watershed Size:	415 mi ²
Primary Land Use:	Forested (80%) Agriculture (20%)
Major Communities:	Village of Catskill
Town(s):	Catskill, Cairo, Athens, Greenville, Durham, Westerlo, Rensselaerville
Key Watershed Group:	The Greene Co. SWCD and the Clearwater Chapter of Trout Unlimited are most actively involved.
Projected Watershed Changes (10 years):	It is expected that this watershed will remain primarily rural. Some urbanization is projected for the southern most portions.
Ecologically Significant Areas:	NYS DOS designated Hudson River Significant Tidal Areas.



Current Status and On-Going Efforts

Stream Corridors	At the current time, streambank erosion is considered the primary issue affecting water quality in the Catskill Creek. A 1985 assessment flagged 93 sites along the Catskill Creek as needing stabilization. Lack of funding continues to be the main obstacle in re-mediation.
On-Site Waste Water System	The municipal wastewater treatment facility in the Town of Greenville has been flag as needing upgrading. Lack of adequate funding remains an obstacle. It is suspected that other small-scale systems may also be contributing to elevated nutrient and pathogen levels, although no supporting documentation currently exists.
Stormwater Runoff	Stormwater runoff problems in the watershed are considered to be isolated. The Village of Catskill does have a CSO that contributes sewage-tainted runoff during large storm events.
Floodplains	Due to the natural topography of the area, flooding issues are present in several areas of the Catskill Creek watershed. Although there is currently no watershed based flood protection plans in effect, the GCSWCD is currently working with the Town of Catskill to develop a comprehensive flood management strategy.
Agriculture	Agriculture has been steadily declining in the Catskill Creek watershed – particularly animal agriculture operations. In 1998, AEM assessments of existing operations indicated that agriculture is not a significant threat to water quality in the watershed.
Wetlands	Overall, there appears to be little net loss of wetlands, however, wetland degradation is a widespread issue.
Lakes and Reservoirs	The Catskill Creek watershed contains several private, public and municipal impoundments. At the current time, North-South Lake is the only impoundment with a management strategy in effect. Hollister Lake has been identified by the Greene Co. SWCD as a high priority for needing a management plan to address aquatic vegetation.
Habitat and Biodiversity	The HREP is currently beginning to approach communities in the watershed to address biodiversity issues.
Coastal and Marine Resources	NYS DOS has identified the lower reaches of the Catskill Creek as a Hudson River Significant Tidal Habitat. It is an important spawning habitat for American shad, alewife, blueback herring, white perch, and small and large mouth bass. NYS DOS has put forth a number of recommendations for this area to protect the fisheries, including emergency spill plans, sound maintenance activities, and stormwater management recommendations. In addition, the lower portion of the Catskill Creek is involved with on-going efforts to revitalize waterfront areas.
Solid and Hazardous Waste Sources	The Catskill Creek watershed contains no active landfills. All past landfills have been closed following NYSDEC criteria for closure and monitoring. At the current time, all known hazardous waste sites are in various stages of remediation.
Roadways and Right-of-Ways	All salt storage facilities in the watershed are stored under well-designed sheds.

Restoration and Protection Opportunities

Resource Concern	Restoration Opportunities	Protection Opportunities
Stream Corridors	Seek grant funds for complete assessment of stream conditions in watershed.	Educate local decision-makers on stream health. Develop and implement a Stream Management Strategy for the Catskill Creek.
On-Site Wastewater Systems	Design and implement a program for sample testing of on-site systems.	Provide additional training to building inspectors and septic inspectors, particularly on soils. Provide education and outreach on proper septic siting. Develop a long-term septic maintenance program.
Stormwater Runoff	Work with Village of Catskill on alternatives to the existing CSO.	Develop and implement a Stormwater Management Plan for the watershed.
Floodplains	Implement infrastructure improvements (e.g. up-sizing culverts) particularly in the Hamlet of Palenville.	Develop a comprehensive stream management plan for the upper Kaaterskill Creek. Develop an education/outreach program for building inspectors, realtors, insurance agents, landowners and developers on floodplain regulations, site development, the National Flood Insurance Program, and flood proofing existing structures.
Agriculture	Evaluate the potential for increasing participation in USDA Farm Bill Programs for conservation.	Continue to work on a Farmland Protection Plan for Greene Co.
Wetlands		Conduct a comprehensive study of historical and existing wetlands in the watershed to establish a baseline record. Establish a wetland mitigation strategy for commercial/industrial development.
Lakes and Reservoirs	Work with the Village of Athens to conduct an assessment of the Hollister Lake watershed and seek funding assist in aquatic weed control.	Develop Lake Management Plans for all impoundments, particularly those that are used as water supplies. Enforce existing rules and regulations effecting development in these watersheds.
Habitat and Biodiversity	Assist the HREP in their biodiversity outreach program.	Work with NYSDEC and HREP in developing a watershed strategy for protecting critical habitats.
Coastal and Marine Resources	Work with NYS DEC and HREP in their goals to soften shorelines along the Hudson River. Enhance public awareness of the HR Estuary by using Stormwater Stenciling, particularly in the Village of Catskill.	Establish a boater education program to protect Submerged Aquatic Vegetation in the Estuary. Provide additional outreach and education to land-owners adjacent to the Hudson River on River Stewardship issues.
Solid and Hazardous Waste Sources		Further evaluate the impact of hazardous material sites and closed landfills on the watershed.
Roadways and Right-of-Ways		Work with Cornell Local Roads program to train local highways departments on environmentally friendly uses of abrasives and deicing materials.

Using Watershed Restoration and Protection Strategy (WRAPS) Approach to Update County Water Quality Strategies

Objective: To provide a method for conducting a locally led, watershed based, conservation needs assessment that can be used by County Water Quality Coordinating Committees (CWQCC) to identify nonpoint source pollution and other natural resource restoration and protection needs.

1. CWQCCs prioritize their watersheds for developing WRAPS using the attached matrix as a guide. (Note : The matrix could be used to prioritize sub-watersheds within a community)
2. Key WQCC members (SWCD, EMC, NRCS, regional DEC staff) fill in the attached “watershed assessment tool” that contains worksheets for identifying natural resource concerns for each land use within a priority watershed or sub-watershed.
3. Restoration and protection strategy prepared to address each resource concern in the priority watershed using the attached Catskill Creek template as an example.
4. Draft strategies reviewed with CWQCC and adjacent counties to ensure completeness and to develop consensus on future actions needed.
5. CWQCC then develops annual work plan for addressing concerns identified in each watershed strategy to enhance coordination of efforts between agencies, organizations, local governments and counties.
6. CWQCC provides annual report to county legislature on progress in addressing individual watershed needs.

*WRAPS implementation tools: AEM, CEM, HOME*A*SYST, etc.*

3.3 Watershed Planning Pitfalls and Tools

The Center for Watershed Protection's *Rapid Watershed Planning Handbook* preface lists 10 pitfalls of watershed plans. These are also some of same pitfalls that other planning efforts (including master planning) often face. They are worth mentioning and should be addressed at every stage of a CEM initiative.

- Plan is conducted at too large a scale.
- Plan is a one-time study rather than a long-term continuous management.
- Plan lacks local ownership and key stakeholder involvement.
- Plan does not address the issue of land change within the watershed.
- Budget for watershed plan insufficient.
- Plan focuses on the tools of watershed analysis rather than the outcome.
- Document was too long or complex.
- Plan does not assess adequacy of local program to implement recommendations.
- Plan recommendation(s) were too general.
- Plan had no requirements or meaning.

The *Rapid Watershed Planning Handbook* also lists eight tools for watershed protection. They are:

- Land Use & Watershed Planning
- Land Conservation
- Aquatic Buffers
- Better Site Design
- Erosion and Sediment Control
- Stormwater Best Management Practices (BMPs)
- Non-Stormwater Discharges
- Watershed Stewardship Programs

CEM incorporates these tools and others into its initiative. The question is how do we use and implement these tools and their components without falling into the ten pitfalls listed above?

3.4 Need for New Assessment & Planning Tools

As mentioned before, CEM is not trying to reinvent environmental planning or usurp the role of more traditional planning processes. There are many great programs and plans (including the *Rapid Watershed Planning Handbook*) that address non-point source pollution and other environmental issues. CEM has been specially designed to work with local communities in New York State. It has been designed to allow many existing groups (including soil and water

conservation districts, water quality committees, local planning and conservation boards, county planning and others) to work more efficiently and directly with local communities.

These groups have the environmental education, technical tools and expertise that many communities frequently lack. Many of these groups have been established to be the “environmental stewards” in their areas of influence. In addition to their environmental credentials these groups often have direct access to a variety of partners, new ideas, and funding opportunities typically not tapped by local communities. Direct interaction between these groups and local communities is perhaps the best way to address non-point source pollution and other environmental issues. CEM provides a framework that can facilitate, strengthen and guide this interaction.

3.5 Education and Outreach

The primary function of CEM is educational. It is extremely difficult for anyone to be fully versed on all the environmental, social and political issues faced by a community. Often times the environmental issues are the least examined and understood. CEM contains a wealth of background information (and hopes to provide more in future efforts) coupled with a logical step-by-step, issue to possible solution format on diverse environmental issues.

More important than the “textbook” education found in the CEM materials however is the “street” education gained by everyone involved with a CEM initiative. The “street” education is finding ways to working together so that everyone benefits. It’s going over issues and ideas together. It’s about finding solutions that can work at the local level.

Even if you go through the entire CEM process and the elusive implementation tier is not conducted, you have not failed. It may be that no amount of effort, expertise or money would bring about local change. That is important information that you and others need to know. Maybe the “seeds” of future efforts have been planted. Maybe lasting working relationships have been formed. At a minimum, you have a better understanding of how local communities work and function and they have a better understanding of natural resource and water quality issues.

3.6 Implementation

The primary focus of CEM is implementation. Without implementation, there can be no positive environmental change at the local level. CEM provides educational materials/resources and logically moves you from issues and concerns to possible strategies and management options for handling them.

CEM tries to present the best available strategies and options with varying timeframes, capital requirements and levels of complexity. CEM identifies individuals and agencies that can assist with local environmental initiatives. These efforts have a single focus, to make implementation as easy as possible for the establishment of effective local programs for addressing specific environmental and community concerns.

3.7 Advantages of a Tiered Approach

CEM is structured in tiers to provide a logical framework with a beginning (an issue or set of issues is identified) and an end (establishment of effective local programs that address the issue or issues.) Keeping in mind that our primary focus is on implementation, and getting there as easily as possible, CEM needs to be flexible. The five tiers also act as possible different starting points for a CEM initiative.

Many of the parts of a CEM initiative may already be researched, identified and/or in place. Some communities may only have questions about a particular issues or need help with the implementation phase of an existing project. You can enter any tier of CEM to begin a CEM initiative. The tiers are there to provide structure and guidance, but completing all five, in order, may not be necessary for your initiative.