WATERSHEDS OF A LAST GREAT PLACE

A replicable watershed project model

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ABSTRACT: The University of Connecticut Cooperative Extension System (UConn CES) has been working with communities in the Lower Connecticut River Watershed designing and testing a watershed program that is replicable throughout the four state Connecticut River Watershed and for use throughout the country. This model is a coordinated effort between UConn CES Forest Stewardship Program, the UConn CES Nonpoint Education for Municipal Officials (NEMO) Project, the Sea Grant Clean Waters Program, and a number of partnering organizations. Locally led Watershed Committees have strengthened the partnerships in the project, while providing invaluable local perspective, and taking information and increased knowledge and awareness back into their communities. For a watershed scale natural resource-based educational project focusing on water quality to be effective it must involve both the local land-use decision-makers and the people who own the bulk of the land which protects that water resource. In the Project watersheds these are the non-industrial private forest landowners and riparian property owners. The multi-faceted approach designed to reach these audiences and the general public includes:
The establishment of project identity and recognition.
Formation of an advisory committee including private and public participants.
Identification of desired outcomes.
Survey instruments to assess existing knowledge.
Promotional, informational, and educational materials including literature, video, and web site.
Resource inventory tools, including remotely sensed data and GIS, applied on both a watershed and private property scale.
Educational techniques including workshops and field days.
Assessment tools for measuring success.
Plans for follow-up and continuation.
The model draws upon the experience of, and techniques developed by, Cooperative Extension’s NEMO Program, working with land use and municipal decision-makers. In addition, information developed from the outreach campaign for Non-Industrial Private Forest Landowners provides the basis for other portions of the model. The model is a comprehensive outline for the information and educational strategies necessary to establish the groundwork for such plans.

INTRODUCTION - Regional Context: The Connecticut River Ecosystem

Flowing over 400 miles from the Fifth New Hampshire Lake at the Canadian border to its mouth at Old Saybrook, “Quinatucquet”, meaning Long Tidal River, as Native Americans called this great waterway, the Connecticut is the backbone of New England. This river, one of the largest in New England, has had a long history of human habitation and resource destruction. In recent years, however, the Connecticut has gone from being described as “America’s best landscaped sewer” to being designated an American Heritage River, a National Wildlife Refuge, and having the tidal region being named a “Last Great Place” by The Nature Conservancy. This amazing change has come about through hard work by many people.
The Connecticut River is the largest river in the northeast with no city at its mouth. It has suffered no major dredging or filling, and its system of salt, brackish, and freshwater marshes remains remarkably pristine. The 480 square mile “Tidelands Region” (the tidal portion of the river and its watershed) is home to at six known globally rare species and 44 state rare species. The significance of the Connecticut River ecosystems are reflected in the recent designations afforded the river. In 1991, the Silvio O. Conte National Wildlife Refuge was established. The refuge is the entire length of the Connecticut River – over 400 miles from Canada to its mouth at Long Island Sound. In 1999, this 11,000 square mile area in four states was one of the first American Heritage Rivers designated by the President.

The lower Connecticut River is unique in its own way and has received several important designations. In 1993, the 12,000 acres tidal region was designated the “Tidelands Region” by The Nature Conservancy, thus allowing the area to be included in a $300 million program that seeks to protect fragile habitat while promoting compatible human activities. In addition, in 1994, that same region was designated a “Wetlands of International Importance” by international treaty.

The people in the Connecticut River Valley are looking at ways to protect the Connecticut River by planning for the use of its watershed landscapes wisely. The Connecticut River Watershed includes over 400 towns and 2,000,000 residents right in the middle of the Boston to Washington Megalopolis. Pressures for land use changes are as strong here as anywhere in the country. In an effort to accommodate these inevitable changes the watershed projects here are working on balancing land use and natural resources, using education as our strongest tool.

The Watershed Projects

Over the past five years, the University of Connecticut Cooperative Extension System (UConn CES) has partnered with the Silvio O. Conte National Wildlife Refuge, and many other groups in the region, to develop a replicable watershed model for the lower Connecticut River. This model was developed in two watersheds and is being tested in a third. The UConn CES model addresses key audiences within watershed communities and focuses on balancing the natural resources of the area with commercial, industrial, and residential development in the region. From the early beginnings in Chester Creek to working with the 61 square mile Salmon River Watershed, the projects have concentrated on educating municipal officials and landowners alike. This model is not a cookbook approach involving anyone with an issue, but a process whereby municipal officials, non-governmental organizations, and landowners learn together and work to protect the valuable resources that create the communities they live in.

The lower Connecticut River region is comprised of seventeen sub-watersheds – tidal marsh systems and forest uplands linked by drainage patterns. The importance of the Connecticut River, and the recognition of the significant natural resources in the region by municipalities, led to watershed projects in some of the most important tributary watersheds in the Tidelands area.

In 1993 the University of Connecticut Cooperative Extension System (UConn CES), in partnership with The Nature Conservancy (TNC) and the Town of Chester, began working in the Chester Creek Watershed. The focus of the Chester Creek Watershed Project was twofold. The Non-point Education for Municipal Officials (NEMO) project and the Connecticut Forest
Stewardship Program worked together to educate the municipal officials and forest landowners in Chester. While educational efforts focused on the effects land use has on water quality, The Connecticut Chapter of The Nature Conservancy worked for the first time on a landscape scale project that extended beyond the boundaries of their preserves. From the success of this partnership effort between UConn CES and TNC began the Watershed Project Model.

Beginning in 1995, a coalition of public and private groups in the lower Connecticut River “Tidelands Region” began working together on two other priority sub-watersheds to refine the “Watershed Project Model”. At that time a new key partner joined the projects, the Silvio O. Conte National Wildlife Refuge.

The Chester Creek, the Eightmile River, and the Salmon River were chosen for their significant role in the water quality of the Lower Connecticut River. The watersheds were all listed as “Special Focus Areas” for the Silvio O. Conte National Wildlife Refuge in their “Final Action Plan and Environmental Impact Statement” (October 1995). However, as in the first project in Chester Creek, local interest and support of town officials were considered critical to the long-term success of the projects. The Project Partners were interested in using the Chester Creek experience in a watershed spanning more than one town. Because of its high ecological significance, multiple resource values and resource threats, the Eightmile River Watershed was considered a top priority for the next project area. The Eightmile River Watershed occurs largely within the three towns of Lyme, East Haddam, and Salem. Project Partner members contacted the three First Selectmen, who gave their enthusiastic support for the project and made recommendations for the formation of an Eightmile River Watershed Committee. The First Selectmen of East Haddam and Lyme both became members of the Watershed Committee.

In addition to the Project Partner oversight and the support of local elected officials, a widely based Resource Team was organized to provide in depth scientific information to the project. The Resource Team was an integral part of the project from the beginning because of the significance of the natural resources of the Eightmile River and its watershed. This watershed is considered key to the Tidelands Region because there is a broad range of tidal, riverine, and forest natural communities. According to The Nature Conservancy, the Eightmile River itself is an exemplary occurrence of one of Connecticut’s most imperiled natural communities, a high quality free flowing stream that includes:

- Excellent water quality,
- Excellent riparian habitat quality,
- Extensive high quality riverine systems,
- A diversity of aquatic habitats,
- Extensive tidal and fresh water wetland systems,
- Extensive submerged aquatic vegetation,
- And healthy populations of fresh water mussels.

In addition, the Eightmile River supports:

- Healthy runs of anadramous fish,
- A high diversity of fish species,
Exemplary runs of trout, both native and stocked,
Internationally recognized tidal marsh communities,
And large blocks of unfragmented forest.

Another issue plaguing the watersheds of the lower Connecticut River is population growth. Data from the Connecticut River Estuary Regional Planning Agency (CRERPA) and the Connecticut Department of Economic Development present a clear picture of slow, steady, and primarily residential population growth in the Tidelands Region. The population grew 14 percent between 1980 and 1992 and is projected to grow an additional 13 percent by the year 2010. This growth pattern is both incremental and fairly predictable. Over time, it results in significant conversion of forested habitats to other uses, as well as widespread and essentially random fragmentation of the land base. The negative impacts of such land use trends on resource biological diversity and productivity are well known.

The Eightmile River Watershed was chosen as the primary focus in developing the replicable watershed model because of its outstanding natural qualities and the enthusiastic cooperation of the municipal officials in the watershed. The Salmon River Watershed Project is refining and testing the model developed in the Eightmile. Meanwhile, the Chester Creek Committee continues working in Chester on many issues within the watershed. Other communities and organizations in the region have adopted the process to begin their own local watershed studies. These watershed projects, each of which builds on and supports the others, have the enthusiasm and support necessary to continue their work to balance their natural resources with the growth of their communities.

The Watershed Approach: Balancing Conservation and Growth

The Eightmile and Salmon River Watershed Projects are built on the philosophy that “watershed management” is mostly about good land use planning by municipalities and informed land use decisions by individual property owners. Accordingly, project “management” takes the approach of a small planning effort. While each watershed in the Tidelands has a very different “character” to it, the watershed model developed by UConn CES and its partners is flexible enough to work well in many watersheds. The watershed goal for the partners in these projects has always been to balance conservation and growth in the watersheds by identifying, protecting, and enhancing their priority natural resources, and by encouraging land uses and land use patterns protective of those resources.

UConn CES educators and other natural resource professionals work together with a relatively small group of representatives from the towns to plan for growth in watershed communities that will minimize impacts on the natural resources found there. Each Watershed Project Advisory Committee and the Resource Team composition has been allowed to evolve, according to the direction that this planning effort takes. The result is a workable, local Project Committee that keeps the process moving forward.

These watersheds are located in a steadily urbanizing region. However, approximately two-thirds of the land area remains in parcels of fifty acres or more, and over three-quarters of the land area is forested. Over 80% of that forest belong to non-industrial private forest owners (NIPF). Land held in private ownership is subject to change in ownership and use at any time. Change in use
and ownership can affect all members of the community and should be planned for. Through a
detailed inventory and analysis of natural resources within the watershed, and educational
outreach, the watershed projects are providing local planners and decision makers with the data
they need to make effective, high quality plans for conservation and development that will guide
future growth in their towns. In addition, education geared toward landowners can help those
who own the natural resources make better decisions for the future of their property.

By understanding the players in local land use, the Watershed Project Model has focused on key
audiences and structured the model to reach across the communities to those audiences. The
three primary audiences are:

- Municipal Officials
- Locally based Non-profit organizations
- Forest and Riparian Landowners

Educational objectives of the projects are both informational and motivational. The informational
goals for all three audiences were to raise the awareness, knowledge, and/or interest of the
participants in the watershed. Motivational goals were to induce a change in attitude and/or
behavior toward their actions in the watershed.

**Project Organization**

From the beginning of the Chester Creek Project the watershed projects have worked in
partnership with different organizations involving many areas of expertise. In order to maximize
the expertise of these many partners at the community level the projects are coordinated as two
distinct working groups that help each other when necessary and always have information
flowing between them. Local Watershed Project Advisory Committees are comprised of
representatives from the following local sources:

- Board of Selectmen
- Planning and Zoning Commissions
- Wetlands Commissions
- Conservation Commissions
- Economic Development Commissions
- Land Trust
- River and Lake Committees
- Neighborhood organizations
- Key Local Businesses

The Resource Team Partners include representatives from such agencies, departments and not
for profits as:

- University of Connecticut
  - Cooperative Extension
- Wildlife
- Forestry
- Remote Sensing Technology Laboratory
As information flows from the Resource Team Partners to the Watershed Project advisory Committee, the Committee supplements this technical data with their local knowledge to move proceed with implementing activities to achieve watershed goals. Information developed to inform and motivate watershed residents is disseminated through a variety of means.

Goals for Change

Resource Team Goals

The ultimate goal of any project of this type is to effect change, in this case change on a watershed basis. For the Resource Team there was an additional goal. That was to test the hypothesis that a geographically focused campaign, which sought to instill a sense of community by incorporating specifics about local watershed natural resources and available professional resources could produce greater knowledge levels and higher adoption rates than traditional, more generic statewide outreach efforts. The ability monitor these changes defines the success of the informational and educational effort. In the Connecticut River Watershed Projects, change has been tracked different ways for the different target audiences.

Using the CT Forest Stewardship Program as a basis for defining desirable behavioral changes for forest landowners, a survey technique was used to assess changes in behaviors of forest landowners in the Eightmile River Watershed.

The goals for forest landowners are to:

1. Become aware that they are a part of the watershed ecosystem, and that they play an important role in ecosystem health.
2. Increase their knowledge of what is involved in conducting a forest inventory and stewardship plan.
3. Seek information about forest stewardship planning.
4. Exhibit positive changes in key attitudes shown to be predictive of stewardship planning: i.e., issue involvement, perceived threat to oneself, perceived threat to community, self efficacy, collective efficacy, family norms, anticipated personal consequences, and anticipated community consequences (Tyson et al, 1998).
5. Formulate specific stewardship goals.
6. Obtain professional assistance to do stewardship planning.
7. Evaluate the condition of their forestland and compile a written inventory of their forest resources.
8. Develop written forest stewardship plans.

The NEMO (Non-point Education for Municipal Officials) project, which specializes in educational work with municipal officials, assessed change at the municipal level by commission and planning achievements, and the signing of a Conservation Compact between towns.

The goals for municipal officials are to:

1. To become familiar with the natural resources (location and functionality) in the watershed.
2. To become familiar with land use patterns (permanently preserved areas, developed areas, forested areas…) within the watershed.
3. To determine growth and preservation areas within the watershed based upon the natural resources and existing land use patterns.
4. To determine goals for planning and regulatory initiatives that will support the growth and preservation areas.
5. To communicate the goals for the growth and preservation areas to the watershed community.
6. To incorporate comments received through the communication effort.
7. To identify opportunities for all land use volunteers to become involved in the implementation of the goals.
8. To communicate the final goals and opportunities for members of the community to participate in implementation.
9. To initiated plans (involving the community) based upon the goals for the growth and preservation areas.
10. To update zoning, subdivision and inland wetland regulations to reflect the planning documents.
11. To continue to communicate and support any community or land use volunteer (commission) efforts regarding the watershed project goals.

In the Salmon River Watershed Project an additional resource partner has joined the project. The Northeast Applications of Useable Technology In Land planning for Urban Sprawl or NAUTILUS Project of UConn CES. This partner has specific goals pertaining to the use of Geographic Information Systems technology in watershed planning.

The goals for the use of Geographic Information Systems (GIS) technology are:

1. To introduce partners to a variety of basic natural resource information (e.g. local watersheds).
2. To introduce watershed partners to a variety of interpretive natural resource information (e.g. productive forest soils, soils with limitations for on-site septic systems, areas of steep slopes – from digital elevation data). It should be noted that without GIS these data likely would not have been available to the project. They would be too costly and time consuming to prepare.
3. To clearly show the spatial relationships between and among different data sets (e.g. the relationship of town boundaries to watershed boundaries or the relationship between watercourses and wetlands).

4. To educate watershed partners about how natural resources can be analyzed with GIS technology.

5. To produce a series of maps to aid in the establishment, evaluation, and attainment of watershed goals.

6. To facilitate the identification and evaluation of conflicts and opportunities among competing goals.

7. To educate watershed partners about GIS technology with the hope that they acquire and use it in the future.

8. To facilitate the use and understanding of maps by putting interactive maps on the Internet.

9. To inventory, develop and integrate into the project new digital GIS data sets (e.g. farmlands, open space, and archaeological and historic sites).

10. To prepare materials that significantly increase the educational message (e.g. maps that are included in reports and PowerPoint presentations).

Watershed Project Committee Goals:

The goals for each Watershed Project have been developed and voted on by each locally led Watershed Project Advisory Committee.

Goals for the Chester Creek Watershed Project were:

To develop a GIS which contains natural resource and land use data for one of TNC’s core site watersheds within the Tidelands area.

To analyze the core site’s GIS database in order to identify areas in need of conservation planning and to prioritize and target educational programs and conservation activities within the local watershed.

To provide educational GIS images, a GIS database and an educational brochure, which can be used to inform and influence decision making on local natural resource management issues.

To use project results/experience to set up a methodology which can be employed in other areas of concern.

PROJECT GOAL FOR THE EIGHTMILE, as fashioned by the local Advisory Committee, is: *To balance conservation and growth in the Eightmile River watershed by identifying, protecting, and enhancing its priority natural resources, and encouraging land use patterns protective of those resources.*

In addition to the overall goal, the Project’s focus on a natural resource inventory being the key area to begin looking at the watershed in some degree of detail means that natural resources goals needed to be identified as well. In the Eightmile River Watershed Project each sub-committee drafted subsidiary goals for their areas of focus -- land, water, and cultural resources. These goals, and the rationale behind them, appear below.
Land Resources Goal: *To protect and enhance rural landscapes throughout the watershed.*

Why:
to provide habitat for a full range of native wildlife and plant communities
to protect the quality and quantity of water resources
to ensure a sustainable supply of wood and other forest products and benefits for future generations

Water Resources Goal: *To protect and enhance the water resources of the watershed.*

Why:
to protect drinking water
to provide riverine and wetlands habitat for fish and wildlife
to maintain natural drainage patterns and the integrity of riparian (streamside) corridors to prevent flooding and water pollution.

Cultural Resources Goal: *To encourage land use practices that protect significant natural resources and direct future growth to areas that are capable of supporting it.*

Why:
to provide a high quality of life for residents based on a rational balance of resource protection and economic growth
to protect cultural resources
to preserve the rural character of the watershed

**PROJECT GOAL FOR THE SALMON RIVER WATERSHED:**
*To balance conservation and development in the Salmon River Watershed in order to maintain and improve the high quality of the natural resources in the watershed, while accommodating growth in Salmon River Watershed communities.*

To achieve this goal the committee is conducting a series of resource inventories which include: natural, historic, cultural, economic, and residential resources and encourage land use patterns that protect these resources.

Environmental Issues Goal: to protect, connect, maintain, and enhance the natural resources of the Salmon River Watershed. To:
- Provide habitat for a full range of native wildlife
- Sustain the full range of forest native plant communities
- Provide migratory routes for birds, fish, and other wildlife
- Provide vegetative cover for streams
- Maintain and enhance water quality (surface and groundwater and wetlands)
- Reduce impact of invasive plants and animals
- Protect biological communities and rare species
- Provide flood control and protect floodplain habitat
- Maintain natural drainage patterns and manage stormwater flows
- Protect rare and endangered wildlife
Cultural Issues Goal: To ensure the long-term social, economic, and environmental health and vitality of the communities in the watershed. To:

- Protect the archaeological and historical resources of the watershed
- Meet the needs of the present and continue to provide a high quality of life for watershed residents
- Ensure that future generations will be able to meet social, economic, and environmental needs
- Protect and enhance private property values
- Provide forest and agricultural products
- Provide outdoor recreational opportunities
- Preserve the rural character of the watershed
- Maintain existing Salmon River Greenbelt by prioritizing greenways and focus on linking open space

The thread that ties the goals between all these watershed projects is the struggle to maintain their cultural and natural resources while accommodating growth in their communities. The methods they are using are cooperation between partners within their watershed communities and cutting edge GIS information that will allow them to make well-informed decisions.

THE START – getting a Watershed Project “off the ground”

The Connecticut River Valley watershed projects are implemented in a planned way. The series of stages any project goes through is clear, but overlapping. It is very important to recognize that because residents become aware of or involved in the project at various times throughout its life, the earlier stages are continually taking place. The activities in a watershed project occur in the following stages.

Stage 1: Initial Project Activities

Initial project activities can be grouped into four categories.

1) **Project Identity:** A project name and logo should be designed. This name and logo should be used on letterhead, newsletters, and any other project articles such as tee shirts, hats and the like. A project identity is important for recognition of the project and watershed for the duration of the initiative. During the campaign identity stage the following should also occur:
   a) Development of a website
   b) A 1-800 number should be assigned to the project
   c) Staff or volunteers should be organized to support the project as much as possible

2) **Partners:** Key community partners should be identified and enlisted in the project. Partners in the Connecticut River Watershed projects included: Boards of Selectmen, town managers, conservation and wetlands commission representatives, local landowners, members selected to represent local lake and neighborhood associations and land trusts. Identification of these
key partners took place over the first 6 months of the project. Partners will be continually changing throughout the life of the project.

3) **Geographic Information Systems (GIS):** Early in the project a natural resource inventory (NRI) should be conducted. The NRI should include information identifying sensitive areas within the watershed. The NRI can also be linked with town assessor data to allow landowners to in the sensitive areas to be identified. Landowner survey data may be geographically coded and associated parcel data may be digitized so that human dimension data can be layered with natural resource data. Combining the NRI with landowner data will allow targeted education for key landowners. A GIS inventory and work with a landowner database should be completed within the first year of the project.

4) **Getting the word out:** Development of outreach tools should be based on information gleaned from the landowner survey and work with municipal officials in the watershed. In the Connecticut River Watershed projects outreach education was primarily conducted by the University of Connecticut Cooperative Extension System (UConn CES) and focused on municipal officials using the Non-point Education for Municipal Officials (NEMO) model; the forest stewardship model; Clean Waters programs, with some input from the Connecticut Department of Environmental Protection (DEP) and The Nature Conservancy (TNC). These tools include:

a) **Printed materials:**
   i) Glossy *informational brochure*, which showcases the project, title, logo, partners, website and 1-800 number.
   ii) *Forest Stewardship brochure* which tells briefly about options for property stewardship and shows the project title, logo, lists DEP and forest stewardship partners and contacts, has the website listed and the 1-800 number.
   iii) *Informational video:* Some projects may create a short informational video for direct mailing to landowners, and to have available in town libraries, schools, town halls, etc. These videos can also be used by businesses in the region and chambers of commerce that may want to promote the natural resources of the area. This video should be started before the project really begins and should be circulated early in the project to educate all residents of the watershed.

b) **Kick-off meetings** should be held around the watershed. Meetings should be organized to educate residents on the project using the logo and project identity throughout the meetings. Partner members should be encouraged to speak on the importance of the natural resource and the character of the communities in the project.

c) **Press releases and feature stories** should be generated in all watershed papers. The watershed committee should cultivate media/journalist contacts to make sure there is ongoing coverage of the watershed project.

d) **PSA’s** or Public Service Announcements should be recorded and video-taped for the project depicting the logo and project identity, identifying projects issues and goals, and showing the website and contact numbers. These should be circulated to all local TV and radio stations, with particular attention paid to local cable access stations for watershed communities.

e) **Website,** as mentioned earlier, a website with an option to engage in a chatroom/discussion forum should be developed. This website should incorporate as much information, including GIS maps, as possible about the watershed. Web
information might include: river history, health, project committee members, meeting dates, publications, links to cooperating agencies, links to town pages, related school activities, and the like.

Stage 2 – Increasing local knowledge of the resource

Landowners, municipal officials and residents of the watershed should become aware and knowledgeable of what is meant by a watershed and why their watershed is important. Project messages are developed from the stated goals.

The goals of the project are based on municipal and partner input and the results of the landowner survey conducted early on in the project process. One of the key issues in all projects will be to define the term “watershed” so that as many residents as possible understand the term and know where they are within the watershed. An additional universal issue is the role that the resident or municipal official plays in the watershed. A key component of all watershed projects in this model is the connectivity of the individual landowner or official to the watershed. This connectivity also helps to promote the watershed identity, project name identity and image.

The methods of increasing local knowledge of the resource are parallel with those of increasing the project identity. However, the intended outcome is different. Here there is more scientific information given and the understanding of the watershed as an ecosystem that affects the community is deeper. The same outlets are used: watershed wide meetings, press, feature articles, website, etc. But by this point in the Watershed Project, the identity should be established and basic information built upon. This can be achieved by:

1) **A Conservation Compact**, stating that the municipalities agree to work together to balance conservation and development within the watershed can be voted on in each community and signed by town Chief Executive Officers. (A copy of the Eightmile River Watershed Conservation Compact is attached in the appendix.)

2) **Forest Stewardship field activities and events** can be offered to landowners. Using a mailing list compiled from the landowner survey, invitations accompanied by a watershed brochure and other information can be mailed to key landowners inviting them to a walk on a local property, and learn about management options. Information before and during the walk should be tailored to the project, with a focus on the importance of each landowner’s actions in the watershed.

3) **NEMO workshops** should be scheduled for municipal officials in communities that have access to a state NEMO program. (A list of the types of information available to be tailored to local watersheds is attached in the appendix.)

4) **Press releases about events and feature articles and TV/radio coverage** should be encouraged for each event.

Stage 3: Attitude change and Motivation

Through information presented and circulated in stages one and two, landowners and municipal officials alike should develop a concern for the risks associated with the watershed’s environmental health. These risks can then be balanced with the growth of watershed
communities through a series of methods ranging from development or update of a town’s plan for conservation and development to implementation of pertinent forms of property stewardship. Through the educational processes of stages one and two, there should be a concern for and knowledge of environmental risks to the watershed, a better understanding of the positive benefits of planning for the future at the municipal and landowner levels, confidence in their abilities to do planning at all levels, and the belief that in doing this planning they are working positively for the future of the watershed and community that they are a part of.

Outreach messages at this point in the Watershed Project should clearly identify the threats to the watershed’s environmental health and explain how municipal and private landowner planning can make a key difference in alleviating these threats, highlight the overall benefits of planning and alleviate any concerns, boost confidence that planning for stewardship and the community as a whole will help stem problems while allowing for change and growth, and give nearby examples of communities and landowners that are doing planning successfully.

Communication channels at this stage of the project are extremely important and must be tailored to the explicit needs of the community as well as individual landowners. This stage is perhaps the most intense and longest lasting of the Watershed Project. In fact, if the project has an ending date or target, such as a Watershed Plan, this stage will likely continue long after the Project is over. The result of stage 3 is really the long-term effects of the increased knowledge resulting from the educational outreach to all segments of the Watershed population.

The Watershed Projects in the Lower Connecticut River used a series of methods to achieve these long-term goals. While the publications, videos, and websites were used by all audiences, the outreach education was divided into that for municipal audiences and that for the forest land owner audience. The UConn CES staff working on the project tailored general educational programs to the watershed audiences and conducted workshops and individual outreach in a focused manor. The outreach results indicate that such a focused outreach program has significantly increased benefits to the environmental resources of a region.

Targeted Outreach Programs

The UConn CES watershed programs are driven by education at all levels of a watershed community. Through Cooperative Extension educational programs school children learn about their watershed through an integrated curriculum, land owners learn about the causes and effects of their day to day activities, municipal officials understand the roles and responsibilities of their positions and the long term impacts of their decisions, and property owners learn about stewardship, estate planning and the role they play in the larger community.

The Cooperative Extension System (CES) is a nation-wide educational network, which is a part of land grant and sea grant universities. CES “provides practical learning resources to address complex problems… Teams of professional and trained volunteers teach the diverse population how to make informed choices and decisions affecting their lives and environment. Cooperative Extension also partners with volunteers, organizations, and agencies to develop programs and train their personnel. This effectively magnifies the scope and impact of Extension’s educational efforts many times over.” The watershed project model extensively uses several CES programs to bring education to watershed residents.
The Watershed Projects use information from the UConn CES Non-point Education for Municipal Officials NEMO program, the State Forest Stewardship Program, Sea Grant Clean Waters and wetlands programs, and the Wildlife Resources Team. The workshops, presentations and fact sheets developed by all these programs are an integral part of the Watershed educational process.

**NEMO: Outreach for Municipal Officials**

The University of Connecticut’s *Nonpoint Education for Municipal Officials (NEMO) Project* is a research-based educational program for land use decision makers that addresses the links between land use and natural resource protection, with a particular focus on water resources. NEMO promotes natural resource-based planning, with programs that help communities to pursue both the conservation and development sides of the equation.

NEMO was created in 1991 by the University of Connecticut Cooperative Extension System, in partnership with two other branches of the University, the Department of Natural Resources Management and Engineering, and the Connecticut Sea Grant Program. NEMO is funded by a number of federal and state agencies, with major external funding coming from the USDA Cooperative Research, Education and Extension Service (CSREES), the U.S. EPA, and the Connecticut Department of Environmental Protection.

The project was originally conceived as a pilot, to explore the potential of using advanced technologies – geographic information systems (GIS), remote sensing (RS), and World Wide Web (WWW) – as tools to educate the target audience of local land use decision makers about the links between land use and water quality (Arnold *et al.*, 1993). Almost nine years later, NEMO encompasses a number of educational programs on the town and watershed level in Connecticut, and is at the center of a growing network of projects around the country founded on the NEMO model.

NEMO is tightly focused on its target audience. The world of county and municipal land use commissioners presents a number of thorny problems: high turnover in membership; complex issues; a narrow focus on their regulatory responsibilities; and, most importantly, the inability to track the cumulative impacts of the case-by-case land use decisions that are made on a daily basis. To surmount these problems, NEMO uses a combination of advanced technology and good old-fashioned Extension education. NEMO uses GIS and RS images to present information on land use in a succinct and intuitive way for this very busy audience. Simple and colorful images of land cover, hydrography, soils and other key environmental data can go a long way toward explaining concepts like the workings of a watershed, the importance of riparian buffers, and effects of land use on water resource health.
NEMO educational programs use RS and GIS as tools to promote natural resource based planning, which can be simplified into three main endeavors for a given community: (1) identifying and prioritizing natural resources; (2) moving to conserve priority natural resources, and; (3) identifying the land most suited for development, and developing that land in a manner that least impacts natural resources. For each of these areas, NEMO offers educational programs and materials. Currently, the project has 13 such follow up programs, on topics ranging from GIS and RS technology to open space planning to impervious surface reduction (figure 1). The NEMO Project is described more fully in a related paper, The Role of Land Use Education in Assisting Urbanizing Communities in the Newest Round of Water Resource Regulation, Arnold, et al. 2000

Forest Stewardship: Outreach for Forest Landowners

The Connecticut Forest Stewardship Program is a cooperative effort by many of Connecticut's environmental organizations and individuals, both public and private, with the goal of encouraging woodland owners to more actively pursue long-term ecologically sound stewardship of their property. Sponsored by the USDA Forest Service, the Forest Stewardship Program has been implemented in many states and can be utilized effectively as a programmatic tool in watershed projects where the bulk of the land area is held by non-industrial private forest landowners.

Stewardship is more than a vision - it is responsible action for the care and wise use of our forestland and its resources. It's a personal commitment to do "the right thing" for the land so that our children will inherit forests that provide them with all of the same pleasures and opportunities Connecticut's woodlands do today -- and more!

A key educational message delivered within the context of the Watershed Projects has been that the first step toward responsible stewardship is developing a Forest Stewardship plan for a landowner’s property. The stewardship plan helps a landowner better understand the natural relationships between the trees and other plants, wildlife, water, and soils that make up their forest. It will also help them focus on the real goals that can be achieved for the long term use of their land. By promoting the long term use of forest land as forest land, long term benefits to watershed protection can be achieved. Educating landowners as to the benefits of forest stewardship, providing information about long term management options, and directing
landowners to sources of professional forestry assistance, are means by which the Forest Stewardship Program is used to accomplish watershed project goals.

Technical assistance and educational opportunities are available through the Connecticut Forest Stewardship Program to help a landowner prepare and carry out a Forest Stewardship Plan. The plan provides maps, a description of the forest, its condition, and conservation activities that can be undertaken which are tailored to the hopes and needs of the landowner.

As part of the Eightmile River Watershed project, a detailed analysis of the Forest Stewardship Outreach Campaign was conducted to assess the effectiveness of methods being used to increase the awareness and adoption of “Stewardship behaviors” on the part of landowners. This analysis is presented in its entirety in Appendix 1.

DO WE HAVE TO DO IT ALL?!  Introduction to The Tiered Model

Recognizing that watersheds vary dramatically in size, type and the finances of the watershed committee, this model offers a tiered approach to a watershed research and educational model. The tiered model approach for watershed projects is based on the amount of resources that are available to the watershed project and the commitment of the volunteer committee as a whole.

The tiered model is based on three levels of financial and time commitments. The volunteer model involves the least amount of financial input. The moderate cost approach requires some financial resources and also relies on strong volunteer commitment. The in depth project model involves a committed financial base that will allow for an in depth study process, and result in a detailed report and most likely a paid watershed staff. All three tiers build on one another. And all three levels are dependent on a natural resource inventory and education at all levels of the community.

Each of these models assumes there will be continuing outreach efforts through the watershed committee that go beyond the years of intensive work. This voluntary outreach work will continue to educate municipal officials, forest and riparian land owners, and the general citizenry of the watershed of the importance of their watershed in the context of the surrounding landscape. Education at all levels needs to continue as new people move into the area, new volunteers sit on boards, and elections change town leaders.

Project Model Goals

The goals of any CES led watershed project are education. To achieve this, project model goals for education are:

- That all citizens know what a watershed is and how it is linked together by natural resources.
- That all citizens in the watershed will be familiar with the targeted watershed and that they understand they are an integral part of that watershed.
• That forest land owners in the watershed know about the assets they hold, know where to seek information on their property, and know about options offered them by their state forest foresters.

• That municipal officials in the watershed know what a watershed is and how the resources they control through regulation are interlinked within the watershed.

• That riparian landowners have knowledge of the affects they have on the waterway they live adjacent to.

**Achievement of Project Model Goals**

Indications that the watershed project goals are being achieved include:

**Forest Land Owners** will conduct forest inventories and assessments for their land and work out specific stewardship goals. These goals may be formulated into a forest stewardship plan for their land or may be general goals for the future of their property, including estate planning.

**Riparian Land Owners** should achieve an understanding of the important part they play in their watershed. They might do this by signing a personal conservation compact which formalizes this understanding. They may also have implemented projects which improve wildlife habitat on their property, be working to reduce impervious surfaces and runoff from their property, or use newly learned water-wise landscaping practices.

**Towns:** Achievement of goals at the municipal level may take even longer to document than at the landowner achievements. However, the following areas of change should occur:

• changes should be made to municipal plans of conservation and development to reflect the important resources of the watershed,
• information resulting from the natural resource inventory (NRI) of the watershed that indicate areas that are important for protection and those more suitable for development should be incorporated into plans, zoning regulations and by conservation commissions,
• wetland regulations should reflect information gleaned from the NRI.

Other achievements may include a multi-town Conservation Compact which state that all signed towns will work together to maintain the quality of the natural resources in the watershed and inter-town meetings to discuss watershed issues.
OUTLINES FOR WATERSHED PROJECTS Simple to Complex:

The Volunteer Watershed Project

- Formation of a volunteer watershed committee led by a CES Coordinator/educator a volunteer coordinator from a local conservation commission, planning sub-committee, land trust, or neighborhood.

- A basic natural resource inventory (NRI) must be conducted. NRI layers must include:
  - A town base map
  - Map of Committed Open Space by Parcel
  - Map of Uncommitted Open Space by Parcel
  - Map of all Water Resources
  - Natural and Cultural Areas Designated for Open Space Protection
  - Potential Wildlife Corridors

More information on conducting an NRI can be obtained from UConn CES publication titled “Manual of Mapping Techniques for Natural Resource Inventories.

- Educational outreach to conservation, wetlands, and economic development commissions
- Support of chief elected officials
- Educational outreach to forest land owners over 10 acres
- Educational outreach to land trusts, garden clubs, and civic organizations
- At completion of the Watershed project produce final product based on goals and needs of watershed.

A Medium-Complexity Watershed Project Outline

- Formation of a volunteer watershed committee led by a CES Coordinator/educator a volunteer coordinator from a local conservation commission, planning sub-committee, land trust, or neighborhood.

- Commitment by a watershed coordinator, which may or may not be financed by grants.

- Enhanced NRI conducted by trained GIS personnel, perhaps connected to a town hall owned computer, using ArcView or comparable software to do simple analysis of resources in watershed.

- Educational outreach to all town boards and commissions, as well as multi-board and commission meetings.

- Support of chief elected officials

- Work toward signing of town wide conservation compact
• Educational outreach to forest landowners over 5 acres

• Educational outreach to land trusts, garden clubs, civic groups, and existing neighborhood groups.

• At completion of the Watershed project produce final product based on goals and needs of watershed.

**An In-Depth Watershed Project Model Outline**

• Formation of a volunteer watershed committee led by a CES Coordinator/educator a volunteer coordinator from a local conservation commission, planning sub-committee, land trust, or neighborhood.

• Full time commitment by a watershed coordinator, which may or may not be financed by grants.

• Produce a full inventory of natural resources conducted by a trained GIS technician, perhaps connected to a town hall owned computer facility, using ArcView or comparable software. This will create the project “Data Dictionary” of all resources in the watershed.

• Create an analytical map series using ArcView, ArcInfo, ERDAS Imagine, or comparable software, to analyze all available data layers for the watershed in terms of their relationships to natural resources and cultural resources. This analysis should be performed with the input of subcommittees who have volunteered to work on this aspect of the watershed project from the overall committee. This analysis must include local residents in the watershed for ground truthing of the GIS and satellite information.

• Produce a series of “public” maps that watershed committee members can leave hanging in town halls, libraries, use in schools, and post on the web. These maps should be fairly self explanatory and be simplified from the original NRI.

• Create a watershed website to promote project and GIS information.

• Conduct educational outreach to all town boards and commissions, as well sa multi-board and commission meetings with updates on a regular basis.

• Support of chief elected officials

• Work toward signing of town wide conservation compact

• Educational outreach to forest landowners over 5 acres

• Educational outreach to land trusts, garden clubs, civic groups, and existing neighborhood groups.
• Produce a slide/PowerPoint show that will be used by watershed committee members throughout the watershed to promote the ongoing project and inform residents of the work accomplished by the project.

• At completion of the Watershed project produce final product based on goals and needs of watershed.

Conduct case studies of a key area of concern for the watershed.

The following are examples of case studies for key areas of concern in the Lower Connecticut River Watershed Projects:

Case Study in the Chester Creek Watershed: A Neighborhood Forest

In Connecticut, as well as throughout the Northeast the forest resource continues to be divided into smaller and smaller ownership parcels – parcelization of the resource leading to fragmentation and loss of manageability. The Chester Creek Watershed Project examined the problem from the context of parcel of forest land which had been subdivided into a number of smaller, primarily residential, parcels.

Realizing that the “rear” or unbuilt-upon portions of these abutting parcels still comprised a sizable contiguous forested acreage, the landowners joined in an effort to manage the forest for mutually beneficial goals. A Forest Stewardship Plan was prepared for the joint ownership, with assistance from the Watershed Project Partners. This activity raised the awareness of many homeowners about the Watershed Project goals, proper forest stewardship, and their role in protecting the resources.

Case study in the Eightmile: Forest Fragmentation

The rise of suburban sprawl as a prevalent development pattern has resulted in extensive disruption, or fragmentation of the natural landscape, resulting in reducing the diversity of wildlife, degradation of water resources and impact on community character. The Eightmile River Watershed Project addressed this issue in detail, utilizing GIS mapping technologies to identify contiguous areas of unfragmented forest and implement activities to protect them. These activities include permanently protecting large parcels through purchase or easement, protecting a network of smaller parcels as well, and identifying the key parcels that connect these larger areas, to target for protection efforts. Creative use of GIS technology to identify and highlight the environmentally sensitive areas that are at the most risk for development has been a key methodology in prioritizing watershed protection efforts.

Figure 2. Map of Eightmile River watershed, showing water systems in blue, major roads in red, and unfragmented forest blocks in green.
Case Study in the Salmon: Sprawl in New England

The Salmon River Watershed is a key focus watershed for the UConn NAUTILUS Project. The case study looks at the changing New England landscape in a relatively large watershed under high development pressure. The 11 towns watershed, of which there are 7 focus communities, is tracking changes in the watershed landscape over the last forty years.

Land-use in the Salmon River Watershed has been significantly altered over recent history. NAUTILUS is studying the impacts of the area’s suburbanization and its associated increase of impervious surfaces on the water quality in the Salmon River, and how those landscape changes are affecting various aspects of other natural communities there.

To do this, NAUTILUS is backcasting and forecasting in the watershed by using satellite imagery from the 1970’s to the present, in three-year intervals and yearly town hall records. NAUTILUS is using the historical and current records to construct predictive models which will be used as indicators for sprawl in the New England landscape.
Appendix 1.

An Outreach Campaign for Non-Industrial Private Forest Landowners

The Eightmile River campaign was based on set of key strategic public communication principles. The term "strategic" is emphasized – i.e., the scientific planning and management of a temporal outreach effort designed to attain a specific goal. The objectives of most public communication campaigns can be characterized one of two ways. Objectives may be informational, where the aim is to raise awareness, knowledge, and/or interest, or they may be motivational, where the aim is to induce attitude and/or behavior change. Often a staged approach is followed that begins with informational objectives and, once this foundation is laid, shifts its focus to motivational objectives. The Eightmile River Project was staged in such a manner. Planning the process involves finding answers to several key questions:

- Why? Define outreach goals and objectives.
- Who? Identify target audiences and their characteristics.
- What? Formulate message content.
- How? Determine source(s) and message treatment.
- Where? Choose communication channels.

Why? Define the goals and objectives

Data from the Connecticut River Estuary Regional Planning Agency and the Connecticut Department of Economic Development paint a clear picture of slow, steady, and primarily residential population growth in the Tidelands Region. The population grew 14% between 1980 and 1992, and is projected to grow an additional 13 percent by the year 2010. This growth pattern is both incremental and fairly predictable. Over time, it results in significant conversion of forested habitats to other uses, as well as widespread and essentially random fragmentation of the land base. The negative impacts of such land use trends on resource biodiversity and productivity are well known.

Local forest products markets are strong for high quality timber products, but marginal or lacking for lower quality products such as pulpwood and fuelwood. Further, studies suggest that less than one Connecticut timber harvest in eight have any professional forestry input or oversight. Over the past several decades, these factors have combined to produce significant “hi-grading” of forest resources with a resultant loss of economic and habitat productivity, sometimes accompanied by unnecessary degradation of wetland and riparian habitats.

The outreach campaign was launched in response to these issues. Its goals were to increase awareness of, knowledge of, and interest in these resource-related problems, as well as the need for good forest and wildlife stewardship within the watershed. Once informational objectives were realized the focus would shift to motivational objectives by promoting the adoption of specific stewardship behaviors. Because over 80% of that forest belongs to non-industrial private (NIPF) owners, they became the logical priority audience.

Specific objectives were for members of the target NIPF owner audience to…

1) become familiar with the broader Eight Mile River Watershed Project and its goals,
2) become knowledgeable about the importance of their land and behavior in the long-term health of the watershed,

3) become knowledgeable about resource inventory and stewardship planning, and the benefits of those activities,

4) show positive pre- to post-campaign changes in attitudes that are key predictors of stewardship behavior (anticipated personal and community consequences, perceived threats, individual and community norms, self efficacy, collective efficacy, and perceived community interaction. See Tyson et al, 1998)

5) seek information about forest and wildlife stewardship planning,

6) obtain professional assistance for stewardship planning,

7) assess conditions and/or compile an inventory of forest and wildlife resources,

8) formulate specific stewardship goals, and

9) develop forest stewardship plans.

Who? Identify target audiences and their characteristics

Efforts aimed at a broad and amorphous group like NIPF owners can hope to achieve informational objectives at best. Narrower, prioritized target audience definition allows for the sharper focus necessary to achieve motivational objectives. The more focused we are, the more we can custom tailor our communication strategy and behavioral messages. Doing this effectively requires learning as much as possible about the characteristics of our potential target audiences.

In the Eightmile River Watershed Project, Tax Assessors' maps and grand lists were used to create a database of all 686 landowners who owned five or more acres of land in the watershed. We then conducted a mail survey of this population.

Preliminary research of the literature led us to construct questions about:

• whether NIPF owners perceived that there were currently threats to the watershed’s environment (Witte, Stokols, Itvarte, & Scheider, 1993);
• the potential costs and benefits of stewardship planning (Andreasen & Tyson, 1994);
• the opinions of family and friends relative to forest & wildlife stewardship (Ajzen & Fishbein, 1980);
• the degree of interaction among NIPF owners in the watershed (Ostrom, 1990).
• favored sources and channels of conservation related information.

These variables are thought to be important determinants of conservation behavior and therefore have great potential as campaign message factors. We then conducted focus group interviews with two small groups of landowners to discuss these questions, and to gauge their feelings and knowledge levels concerning resource protection and planning. The baseline Eightmile River watershed landowner assessment questionnaire was then finalized.

Our analysis began by segmenting the respondents into four groups differentiated by their land ownership & stewardship planning intentions:

☐ Sellers (13%) - those that intend to sell their land on the open market in the near future;
Non-intenders (27%) - those who plan to pass their land on to family, but show little inclination toward forest & wildlife stewardship planning;

Intenders (35%) - those who show strong inclination to protect land from development and/or develop forest & wildlife stewardship plans within the next five years;

Planners (26%) - those who profess to have already taken measures to protect land from development and/or develop forest & wildlife stewardship plans.

We choose the Intenders group as our primary target audience. This group already possessed the desired values, beliefs and intentions. They would require no hard-sell convincing, just reinforcement, direction and perhaps a little motivation. With limited campaign resources, they promised to be the most cost-effective target.

Non-intenders became our secondary audience. They had manifested a degree of stewardship ethic through their desire to keep their land intact for the next generation, and therefore might be receptive to our message regarding forest and wildlife stewardship. Further, based on Diffusion Theory (Rogers, 1995), it was felt that if Intenders could be persuaded to adopt the stewardship behaviors being promoted, they might serve as a model and exert influence on Non-intenders. Planners professed to have already adopted what we were to promote, and Sellers were seen as a group that would most likely drain campaign resources with little positive effect.

What? Formulate message content

With the audience segmented and priorities established, the next step was to utilize what we had learned about them in the survey to formulate ideas for message content. We found that Intenders, compared to other segments, believed strongly that watershed resources were indeed at risk. They thought that rivers and streams, trees and plants, and production of forest products were (respectively) at greatest risk. This was followed by soils, drinking water, and wildlife. Intenders perceived that the top three benefits to be gained from forest stewardship planning were (respectively) preserving natural beauty, insuring that heirs will be able to enjoy the land, and keeping drinking water safe. Not surprisingly, the most important cost considerations were time, money, and effort (respectively). However, when compared with Non-intenders and Sellers, Intenders perceived the costs of doing a stewardship plan to be relatively modest.

What family and friends thought about forest stewardship was important to Intenders. Finally, the data showed that the more Intenders perceived that community members interacted with each other, the more they favored and personalized the need for stewardship planning.


According to information processing theory (Tyson, Hamilton, & Snyder, 1996), positive belief, attitude, or behavior change is a function of high source credibility, high argument quality, and low message discrepancy (the difference between the promoter’s position and the receiver’s initial position). These factors should be kept in mind when designing a communication campaign strategy.

In the Eightmile River watershed, our analyses showed that the most credible sources of information in our Intenders’ eyes were Cooperative Extension System personnel, Department of Environmental Protection foresters, and specialists from The Nature Conservancy. Interestingly, members of these groups comprise much of the project’s steering committee. Intenders considered local landowners and town conservation officials to be significantly less credible. This was a noteworthy finding. It was the original intention of the project planners to send campaign messages through local opinion leaders as much as possible and downplay their own involvement -- the exact opposite of what research results indicated was the best strategy.
Where? Choose communication channels.

According to Diffusion Theory (Rogers, 1995), mass channels are good for achieving informational objectives and personalized channels are good for achieving motivational objectives. Audio-visual channels are good for conveying emotion and are therefore good for creating and maintaining interest. Written channels are good for conveying detailed information that may require repeated reference. These factors should be kept in mind when designing a communication campaign strategy.

Analyses showed that Intenders' favored mass communication channels are newspapers and TV. The more popular papers, stations, and viewing times were identified. We also discovered that personalized channels, which promote community interaction, such as neighborhood meetings or group field workshops, would help personalize the need for conservation planning. As a communication strategy, newspapers and TV could be used to inform and group activities could be used to motivate. In addition, project planners decided to use direct mail video tapes (a unique channel having both mass and personal attributes) to build knowledge and maintain interest. Booklets, distributed through the mail and at group activities, carried the detailed information required for actual behavior.

Final analysis of Survey responses:

It appears that the project was particularly successful in changing attitudes associated with the impact forest stewardship has on the community. This is an important factor because forest stewardship is inherently about caring for resources that extend beyond individual property boundaries. Successful stewardship of a watershed requires community-wide participation. A greater sense of importance concerning the community consequences of forest stewardship should increase individual participation.

From survey results, it would appear that landowners’ contact with the Connecticut Forest Stewardship program, which was the focus of most campaign messages, increased by about a third during the project. Contact with State DEP service foresters increased slightly. Contact with UConn Cooperative Extension remained the highest of all information sources but was unchanged during the project. These three sources of assistance will continue to be the most widely used in the future. Contact with consultant foresters and volunteer master stewards appear to have dropped off a little during the project and they are apt to be the least likely contacted in the future. This is a limitation as they could have played a vital role during the project and their future participation is key to continued adoption/diffusion of project objectives.

It appears that the frequency and overall number of completed resource inventories/evaluations increased during the project and that this pace will continue in a moderate fashion in the future. Forty three percent of respondents report having completed at least some form of assessment during the project, two thirds of which are basic and completed without the help of a professional. Though the project promoted more formal professionally completed resource inventories/evaluations, the importance of teaching landowners to complete their own basic assessment without professional assistance is highlighted. Further support for this can be seen in the following acreage analysis.

In terms of acreage, 3681 acres were inventoried/evaluated in some manner during the project. A total of 1645 acres were inventoried/evaluated by those that said they had completed a basic assessment by themselves or with the help of a friend/neighbour, 1174 acres were inventoried/evaluated by those that said they had completed an informal inventory with the help of a professional forester, and 862 acres were
inventoried by those that said that a formal written inventory had been completed by a professional forester.

Paralleling the increase in landowner resource inventory/evaluation efforts discussed in a previous section of this report, it appears that the frequency and overall number of completed stewardship plans also increased during the project. This pace will continue in a slightly less than moderate fashion in the future. Thirty four percent of respondents report having completed at least some form of a stewardship plan during the project, three quarters of these are general plans that are thought out but unrecorded. Again, paralleling previous comments about the need for a less formal approach to landowner resource inventory/evaluation efforts, though the project promoted more formal written stewardship plans, the importance of less formal plans that may reside only in the minds of landowners should be highlighted. And again, support for this can be seen in the following acreage analysis.

Collectively, landowners who stated they had developed a stewardship plan during the project, written or not, own a total of 3628 acres. Of this, 2407 acres were put under general plans that are thought out but not recorded and 1221 acres were put under formal written stewardship plans.

It would appear that, though the estate conservation planning objectives of the project were never formally developed, the project has had a positive impact on the future intentions of several landowners in this regard.

Summary

The conclusions presented here will be drawn from results of the Outcome Evaluation discussed above. In addition, conclusions drawn in the project Process Evaluation (a separate report based on a qualitative assessment of project processes by 21 project staff and partners patterned on the original eight project objectives) will be reiterated here when applicable and complementary.

1. According to respondents to the Outcome Evaluation survey, the project was very successful in creating awareness of its existence but only moderately successful it establishing familiarity. Approximately half of the project staff and partners that responded to the Process Evaluation survey believe that the project was “marginally” successful in establishing familiarity among watershed forest landowners. Given that project familiarity is crucial to fulfilling subsequent higher level project objectives (e.g., knowledge, attitude, and behavior change), it is somewhat concerning that respondents to both surveys felt the project was only moderately or marginally successful in establishing familiarity among watershed forest landowners. This may have been caused by lack of project publicity, little activity by volunteer master stewards, and the fact that there were few state and consultant foresters to assist landowner. The publications mailed directly to landowners and the demonstration field tours were considered the most successful channels of information for establishing project familiarity.

2. Not unexpectedly given the above conclusion concerning project familiarity, respondents to the Outcome Evaluation survey feel that the project was slightly less than moderately successful in increasing landowner knowledge of resource evaluation and stewardship planning issues. This slightly low figure could be an indication that landowners perceive stewardship practices to be complex and a reflection of their low self-efficacy. Based on results of the Process Evaluation, the success the project had in increasing knowledge of what is involved in forest resource inventory and stewardship planning tasks probably resides mostly in those landowners who attended the demonstration field tours. The type of personal contact that landowners had with professional
foresters at these events and subsequently on their own properties is key to teaching about complex tasks.

3. Outcome Evaluation findings show that use of all information sources increased considerably during the life of the project and that respondents are moderately likely to maintain their use of these sources in the future. The most widely used information source during the project was printed material – used by about one half to two thirds of respondents. Videos were the next most widely used source – used by slightly less than one third of respondents. Demonstration tours were attended by slightly less than one third of respondents. Findings concerning print material and demonstration tours were confirmed in the Process Evaluation. The mail-in card requesting personal assistance that accompanied one of the mailings was cited as a particularly effective communication tool. Greater publicity for the project would probably have generated more information-seeking behavior on the part of landowners. And more personal contact by private consultant foresters and volunteer master stewards would be key follow-up activities to this publicity.

4. Outcome Evaluation results show that the project was particularly successful in changing attitudes associated with the impact forest stewardship has on the community. This is an important factor because forest stewardship is inherently about caring for resources that extend beyond individual property boundaries. Successful stewardship of a watershed requires community-wide participation. A greater sense of importance concerning the community consequences of forest stewardship should increase individual participation.

5. Outcome Evaluation results show that landowners’ contact with the Connecticut Forest Stewardship program, which was the focus of most campaign messages, increased by about a third during the project. Contact with State DEP service foresters increased slightly. Contact with UConn Cooperative Extension remained the highest of all information sources but was unchanged during the project. These three sources of assistance will continue to be the most widely used in the future. Contact with private consultant foresters and volunteer master stewards dropped off a little during the project and they are apt to be the least likely contacted in the future. Process Evaluation results show that the project was successful in helping landowners who requested assistance get the assistance they asked for. Many landowners now know that assistance is available and how to obtain it. Interpersonal contact between landowners and forestry professionals at project events and the referral system linking landowners and professional foresters on landowner properties is a key component of the project. Interpersonal contact with private consultant foresters and volunteer master stewards is key to continued adoption/diffusion of project objectives.

6. Outcome Evaluation results show that the frequency and overall number of completed resource inventories/evaluations increased during the project and that this pace will continue in a moderate fashion in the future. Forty three percent of respondents report have completed at least some form of assessment during the project, two thirds of these are basic and completed without the help of a professional. In terms of acreage, 3681 acres were inventoried/evaluated in some manner during the project. A total of 1645 acres were inventoried/evaluated by those that said they had completed a basic assessment by themselves or with the help of a friend/neighbour, 1174 acres were inventoried/evaluated by those that said they had completed an informal inventory with the help of a professional forester, and 862 acres were inventoried by those that said that a formal written inventory had been completed by a professional forester. Process Evaluation results show that only those landowners enrolled in the SIP had their resources professionally evaluated. The structured nature of the SIP is seen as strength, but obviously the project should not focus solely on formal professionally conducted resource inventories. A mechanism for working with underfunded landowners or landowners less motivated to develop formal resource inventories should be devised.
Outcome Evaluation results highlight the importance of teaching landowners to complete their own basic assessment without professional assistance.

7. Outcome Evaluation results show that on average landowners’ stewardship goals are moderately clear/concrete and primarily involve wanting to keep their land in its natural state and undeveloped. They are willing to manage their land principally for the health of trees and the benefit of wildlife. Process Evaluation results show that larger landowners and/or those involved with the SIP are more inclined to develop formally stated stewardship goals. Discussion during field events and with professional foresters is key to helping landowners develop their goals.

8. Outcome evaluation results show that the frequency and overall number of completed stewardship plans increased during the project. This pace will continue in a slightly less than moderate fashion in the future. Thirty four percent of respondents report having completed at least some form of a stewardship plan during the project, three quarters of these are general plans that are thought out but unrecorded. In terms of acreage, collectively, landowners who stated they had developed a stewardship plan during the project, written or not, own a total of 3628 acres. Of this, 2407 acres were put under general plans that are thought out but not recorded and 1221 acres were put under formal written stewardship plans. Process Evaluation results confirm that only a few landowners developed formal written stewardship plans and that contact with forestry professionals and the SIP cost-share program were keys to this process.

9. Outcome evaluation results show that the frequency of implementing estate conservation measures over the ten-year period before the project is very nearly equal to that achieved during the much shorter (four-year) time frame of the project. It appears that, though the estate conservation planning objectives of the project were never formally developed, the project has had a positive impact on the future intentions of several landowners in this regard.

10. Outcome evaluation results show that several landowners did not engage in practices they might otherwise have engaged in prior to the project. This is an important concept, as curbing detrimental land use practices, even if this results in non-activity, is often times as important as engaging in positive forest stewardship behaviors.