The Northeast States and Caribbean Islands Regional Water Program
Project Narrative

INTRODUCTION

We seek funds for a new integrated water quality project, combining US EPA Regions 1 and 2 into one cohesive regional program entitled **The Northeast States and Caribbean Islands Regional Water Program**. *Our program is based on the premise that the infusion of knowledge and the adoption of best management practices (BMPs) within agricultural, rural, and urbanizing communities will improve the efficiency and effectiveness of water quality protection and improvements.* Our program emerges from the combined research, education, and Extension strengths of the regions' ten Land Grant Universities (LGUs) and incorporates key stakeholders and partners into a framework to advance the protection and improvement of water quality.

This application builds on regional LGU water programs with over seven years of successful accomplishments (Appendix A). An assessment of the integrated LGU water quality programs within Regions 1 and 2 have deepened our understanding of our collective strengths, leveraging opportunities and the needs of our stakeholders. This proposal will reinforce and extend:

1. Our investment in stakeholder-focused research and connections to the research community by including additional researchers and their projects within focus areas;
2. The engagement of graduate and undergraduate students into research and Extension activities to improve understanding and management of water issues by stakeholders;
3. New and existing partnerships, stakeholder involvement, and leveraging;
4. Wide-spread use of outcome-based programs through training in and application of LOGIC models and an Instructional Design Theory model of program planning and design, the ADDIE model (Assessment, Design, Development, Implementation, and Evaluation);
5. The communication of our successful programs, impacts and opportunities via the regional program website; and,
6. Our commitment to strengthening the National Integrated Water Quality Program (NIWQP) via membership on the Committee for Shared Leadership (CSL), national website development and delivery, and participation in national network.

Our long term goal is to strengthen the research, teaching and Extension capacity of LGUs to deliver outcome-based water programs that educate, empower, and engage agricultural producers, residents, and communities throughout the region to steward their local water resources. With eight focus areas and a distributed leadership format, we expand our knowledge base and transfer research-based tools to stakeholders at various scales (home, farm, community and watershed) using a variety of education and outreach activities and outputs. As a result, our stakeholders make science-based decisions and employ management practices that improve the quality and quantity of surface and ground water resources. We engage our students in these endeavors and enrich curricula with new insights and case studies that emerge from the program. The merger of Regions 1 and 2 expands our ability to translate relevant research and technologies into training programs, demonstration projects and management practices tailored to the unique requirements of our stakeholders.

Regions 1 and 2 (hereafter referred to as "the region") include the New England states, New York, New Jersey, Puerto Rico and the Virgin Islands. The region contains: densely populated areas; thousands of miles of Atlantic coast, Caribbean Island marine environments, Great Lakes, bays and estuaries; and numerous major rivers, lakes and wetland systems. Our citizens take great pride in their countryside, with its patchwork of production agriculture, colonial farms, historic villages and independent local governments. The region relies on rural lands to provide plentiful, safe drinking water and sustain the water quality of estuaries and freshwater systems for recreation, fin fishing and shellfishing. But, a compressed geography presents major challenges for water quality protection. In addition, historic approaches to private well development, unsewered wastewater treatment practices and agricultural waste management generate high risks for ground and surface water contamination. Total Maximum Daily Load (TMDL) studies across the region frequently relate water quality problems to nitrogen (N), phosphorus (P) and pathogen inputs from rural and agricultural landscapes. Pesticide, pathogen and N contamination plagues private and public drinking water. Even naturally-occurring contaminants, such as arsenic, present challenges to drinking water protection. More recently, suburban sprawl and rapid development contribute to the loss of forest, agricultural and open lands and their ecological functions. Local governments grapple for watershed management tools to minimize water quality risks from development.

Combining regions will promote the delivery of effective and efficient programs to other parts of the region and expand available resources to address our common water resource issues. For example, our proposed Watershed Assessment focus area includes faculty and staff from five states and incorporates volunteer water quality monitoring programs, modeling approaches at the field and watershed scale and restoration techniques for water quality protection. Our Small Farms Initiative extends a coordinated effort throughout the region and targets a prevalent land use and a significant source of water quality degradation.

To address specific water quality challenges within the region, we will create locally relevant programs focused on land and community management through our eight focus areas. Our Watershed Assessment focus area will also serve a cross-cutting role and help other focus areas prioritize and target high risk areas. We will continue core elements of our current programs. At the regional scale, with input from stakeholders and partners, we will identify needs. We will then develop, test and refine programs with case studies at the local level that leverage other sources of support. At the regional scale, we will build upon successful local programs to create and disseminate new materials, lessons learned, tools and curricula for use by stakeholders and partners. Programmatic outputs will be distributed throughout the national network via our website, national and regional meetings and other venues.

In 2007, an independent panel organized by CSREES reviewed the New England Regional Water Program and affirmed that the program should continue its approach. We have carried the identified strengths into this proposal and made a number of improvements to our cross-cutting activities and the advisory board role – the two areas that were cited as needing improvement.

OBJECTIVES

1. Empower stakeholder participation in regional programs through needs assessments, regional workshops and trainings, conferences and other venues.

2. Promote stakeholder-focused research and Extension and improve water resource curricula.
3. Link and leverage CSREES-funded projects into regional programs and expand the geographic impact of project successes and investments.
4. Assess and improve coordination and effectiveness of regional programs through program planning, evaluation tools, and performance based budgeting.
5. Provide effective liaison efforts to federal, state and local agencies/organizations and universities/colleges in the region to identify emerging issues and maximize leveraging.
6. Develop and launch a Northeast States and Caribbean Islands Regional website to communicate successes and project impacts that describe changes in knowledge, action and conditions for targeted audiences.
7. Strengthen the NIWQP by improving and maintaining the National Water Program Website; maintaining linkages of the regional website to other websites, programs and partners of the NIWQP; and participating in national activities, such as serving on committees formulating eXtension materials on water resources Communities of Practices (CoPs).

COOPERATION AND INSTITUTIONAL UNITS INVOLVED

As in our current regional program, we will manage efforts through a multi-tiered structure of an Executive Committee, a Planning Committee, Advisory Boards, eight focus areas and cross-cutting activities to connect focus areas and integrate research, education, and Extension.

The University of Rhode Island (URI) is the lead institution for this work. URI successfully managed the first 7½ years of the New England Regional Water Program. URI will develop subcontracts for the remaining nine LGUs – the Universities of Connecticut (UConn), Maine (UMaine), Massachusetts (UMass), New Hampshire (UNH), Puerto Rico (UPR), Vermont (UVM), Virgin Islands (UVI), and Rutgers and Cornell Universities.

Executive Committee: Regional management will work through an Executive Committee consisting of Dr. Art Gold, Project Director and CSL member and five Associate Directors:

- Chester Arnold, UConn, Liaison to Sea Grant, NOAA and EPA Region 1
- Rafael Davila-Lopez, UPR, Islands Initiative leader
- Alyson McCann, URI, Project Coordination and Reporting
- Chris Obropta, Rutgers University; Region 2 Liaison; CSL Member
- Julia Peterson, UNH, Planning and Assessment Coordinator

The Executive Committee will assess progress and use performance based budgeting to address project goals and objectives. It will coordinate project activities, respond to shifts in key personnel, clarify NIWQP objectives and build connections within and between focus areas. The Executive Committee will obtain reports from focus areas and other water quality projects within the region, using these to report on program activities, outputs and outcomes. We will cooperate with NIWQP's Region 5 and the CSL to develop a method to report regional impacts and outcomes and incorporate this into responsibilities. Gold, Peterson, and McCann will serve on this reporting committee. In addition the Executive Committee will: develop regional success stories and impact statements; supervise website efforts; coordinate research linkages; serve as liaisons to federal agencies; and participate in national activities. The Executive Committee will coordinate via monthly conference calls, meet semi-annually, and engage in web-based communication.

Planning Committee: The Planning Committee will serve as a communication and coordination vehicle for all individuals with primary responsibilities for project activities. This Committee will consist of the Executive Committee, focus area leaders and co-leaders and the web coordinator. The Planning Committee will coordinate via quarterly conference calls, annual meetings, and web-based communication.

State Principal Investigators (PI): Each State PI will be responsible to: ensure state participation on a minimum of two focus areas; identify and account for focus area participants; develop and manage state budgets that support regional activities; provide input for the functioning of the regional approach; and participate in regional water quality needs assessments. In most cases, the State PI is either a member of the Executive or Planning Committee.

Advisory Boards: In response to our 2007 New England review, we strengthened and formalized the role of our Advisory Boards. An *Internal Advisory Board* will maximize opportunities for coordination and leveraging with other LGU programs. The Internal Advisory Board will receive periodic updates on programs and engage in teleconferences with the Executive Committee semi-annually. Individual board members will be conduits between their respective programs/peers and this Regional Water Program. The Internal Board will consist of:

- Ms. Carrie Koplinka Loehr, Co-Director, Northeastern IPM Center
- Dr. Tom Morris: Professional Development Coordinator, NE SARE
- Dr. John Peckenham, Director, Maine Water Research Institute
- Mr. Roy Jeffrey, UCONN Agriculture and Natural Resources Program Leader
- Dr. Jeff Seemann, Dean and Director, College of Environment and Life Sciences, URI
- Dr. Dan Rossi, Executive Director, Northeast Region AES Directors

An *External Advisory Board* will be selected from the existing Advisory Boards that serve the current regional water programs including representatives of EPA, NRCS, USGS, and stakeholder groups (Appendix C). All board members will participate as team members in one or more focus areas based on their expertise and organizational affiliation. These members will link focus areas to stakeholder needs and priorities and serve as a conduit for leveraging and outreach. The board will be routinely appraised of overall regional activities and convene once a year to provide feedback and guidance on program activities, outputs and outcomes. The Executive Committee and Planning Committee will make final determinations of membership.

The Northeast States and Caribbean Islands Focus Areas: Program delivery emerges from eight focus areas – a proven approach developed in the New England Region. These focus areas tailor the national themes to the strengths of the regional LGUs' research, education and Extension programs and capture the enthusiasm of our partners and stakeholders. Stakeholder involvement is central to each focus area. Additionally, in response to our 2007 program review, we have increased and formalized cross-cutting activities between focus areas. As displayed in Table 1, our approach addresses six of the National Themes through region-wide activities.

Table 1. National Themes and Regional Focus Areas

National Theme	Regional Focus Area	Leader, Inst.	Co-leaders, Inst.	Other Reps
Watershed Mgmt. and Environ. Restoration	Watershed Assessment	Elizabeth Herron, URI	Obropta, Rutgers; Schloss, UNH; Steenhuis, Cornell	UMass UVI
Drinking Water and Human Health	Drinking Water and Private Wells	Alyson McCann, URI	Wilson, UMaine	UVI UPR Cornell
Watershed Mgmt.	NEMO	David Dickson, UConn	Gold, URI	UNH Rutgers Cornell
Pollution Assess. & Prevention	Sustainable Landscaping	Julia Peterson, UNH	Guillard, UConn; Obropta, Rutgers	UMaine URI UVM UPR
Pollution Assess. & Prevention	NE Onsite Wastewater Training Center	George Loomis, URI	Davila-Lopez, UPR	UVI
Nutrient & Pesticide Mgmt. and Animal Waste Mgmt.	Water Quality and Production Agriculture	John Jemison, UMaine	Darby, UVM; Herbert, UMass; Ketterings, Cornell	URI
Nutrient & Pesticide Mgmt. and Animal Waste Mgmt.	Small Farms Initiative	Michael Westendorf, Rutgers	Davila-Lopez, UPR	UVI, UVM
Cross-Cutting	The Islands Initiative	Rafael Davila-Lopez, UPR	Boteng, UVI; Gold, URI	Rutgers UNH

Focus Area Structure and Responsibilities: The components to achieve our goals and objectives are in place, tested and proven effective. Each focus area builds on a track record of accomplishments and provides the leadership to bring research-based Extension programs to specific stakeholder groups. We will continue to build the focus areas into effective and efficient regional programs. Each focus area will consist of a core group of Extension faculty, staff, and researchers and representatives from partner agencies and stakeholders (Appendix C). Focus area members represent a variety of disciplines, including hydrologists, social scientists, engineers, planners, lawyers and economists. Each focus area has a leader who will ensure coordination and progress towards work plans and goals. Focus area teams will:

- Apply the ADDIE model of program planning, implementation, evaluation and reporting. Conduct needs assessments and use the LOGIC model to develop responsive and innovative

research, Extension and education programs directed to stakeholder needs and water quality protection efforts. Develop annual report to the Executive Committee.

- Identify opportunities to transfer and adapt successful elements of locally-based Extension programs throughout the region, which will leverage the enormous investment by partners in our local programs to benefit water quality in the region.
- Identify research gaps that stymie effective Extension programs and seek opportunities and expertise through external or internal funds to address these gaps.
- Seek opportunities to coordinate and develop joint programming between focus areas and inter-regionally to expand expertise and stakeholder value.

METHODS

Cross-cutting Activities: Several activities will strengthen all focus areas and enhance integration of research, education and Extension. These include: training in and using the ADDIE approach for outcome-based programming; mini-grant opportunities; student experiential learning opportunities; stakeholder needs assessments; website development; watershed assessment tools to target high risk sites; and regional publications and impact statements. Focus area teams will engage and incorporate appropriate research from colleagues working on Hatch, National Research Initiative (NRI), and other NIWQP funded projects.

Performance Based Budgeting through Program Planning and Evaluation: Project design, planning, assessment and budgeting will be carried out by using and applying the ADDIE model and developing LOGIC models that focus on stakeholder outcomes. The ADDIE model employs Instructional Design Theory as a systematic approach in Assessment, Design, Development, Implementation and Evaluation steps. The use of LOGIC models and SMART (Specific, Measurable, Audience-directed, Realistic and Time-bound) objectives drive the project design, assessment and reporting phases of the process allowing focus areas to measure their impacts and successes. Peterson will provide regional leadership for program planning, implementation and evaluation through her role as an Associate Director on the Executive Committee. Peterson will support focus areas in the development of their LOGIC models; train in the use of the ADDIE model; and, assess the usefulness of additional evaluation techniques and training modules from NOAA Coastal Services Center and offer training as appropriate.

We will use or adapt assessment tools developed by the focus areas, National Facilitation Projects (two of which are region based) and others to analyze, interpret, evaluate and document program progress and effects in order to determine program effectiveness, improve regional coordination and practice outreach scholarship. These assessment tools include tested methods for collecting pre- and post-participant data to measure changes in attitude, knowledge, behavior and skills. We will use these evaluation tools to determine additional stakeholder training needs.

Each year, the Executive Committee will assess progress towards specific performance outcomes from focus area reports based on their ADDIE and LOGIC models. In addition, stakeholder priorities, leveraging opportunities and the extent of regional engagement from individual states will be used to reorient individual state budgets.

Integrating Graduate and Undergraduate Education: We will provide opportunities for undergraduate and graduate students and incorporate Extension and research tools and

approaches into educational activities. Students will work within focus areas to provide support, assist in the development of outputs, work with our partners and deliver knowledge-based education to stakeholders.
Dedicated Internships: Through appropriate departments at our LGUs, we will create and advertise a number of "for-credit" and paid internship opportunities for students to work with focus areas on both state-based case studies and regionally oriented products.
Graduate Assistantship: URI's College of Environment and Life Sciences will provide a full research assistantship for a graduate student to engage and assist in all aspects of this project for the grant duration (Appendix B). We have budgeted for a number of graduate assistantships to work directly with research and Extension faculty and staff on focus areas (see budget notes).
Enhancing Undergraduate and Graduate Course Content: Faculty in this project will incorporate case study examples, assessment tools and training materials into course labs and lectures. Examples include Watershed Hydrology and Management (URI), GIS Applications in Environmental Science (URI), Turfgrass Management and Design (UConn), Analysis of Agricultural Experiments (UConn), Lake Management (UNH), Introduction to Watershed Management (UNH), General Limnology (UNH), and Bioenvironmental Engineering (Rutgers).

Mini-Grant Opportunities: To sustain momentum following focus area regional conferences and stakeholder or partner-based planning summits, we will offer focus areas the opportunity to obtain mini-grants that target specific outputs, such as curricula development, follow-up workshops, website development or student project support. Funds for these mini-grants will be supplied by URI's Coastal Institute (Appendix B). Where possible, we will leverage these mini-grants with partner funds. This mini-grants concept was successfully piloted by the Northeastern IPM Center during a joint IPM-Water Quality Summit and spawned a series of activities that captured the enthusiasm of participants and created new outputs and directions.

Regional Needs Assessment Survey with Region 10: We will work with Dr. Robert Mahler, PI of the Pacific Northwest Regional Water Program to conduct follow-up surveys to those conducted previously within Regions 1 and 2. The survey will be used to assess stakeholder needs, attitudes and behaviors, and to evaluate the degree of current citizen involvement in water resources issues and what, if any, changes have occurred (Appendix B).

Focus Area Commonalities: Given space constraints, below are common elements of proposed regional focus areas. Specific focus area text begins on page 9.
Focus Area Partners and Leveraging: Focus areas will engage representatives of key stakeholder groups, such as federal, state and local agencies/organizations, private sector professionals and members of trade associations and consumer groups, as listed in Table 2. Partners serve on focus area teams, conduct joint programming, provide input for focus area activities and leverage CSREES investment in regional programs. This approach will allow for broad-based participation in needs assessments and the framing of focus area activities, outputs and outcomes. Activities may be hosted solely by a focus area or held in conjunction with partners' events. Additional leveraging comes as financial support from each participating LGU. More than ten faculty and staff, who provide key leadership to this program, (e.g., serving on the Executive and Planning Committees or as focus area leaders or co-leaders) receive little or no salaries from this grant. Instead, their time commitment is supported by their institutions.

Table 2. Key Partnerships across Focus Areas	Watershed Assessment	Private Wells	NEMO	Onsite Wastewater	Sustainable Landscape	Production Agriculture	Small Farm	Islands Initiative
Regional Level Partnerships:								
CSREES NIWQP funded projects	√		√		√	√	√	
CSREES NRI	√		√		√	√	√	
CSREES IPM					√	√		
USDA-NRCS	√					√	√	√
Nat. Livestock & Poultry Envir. Learning Ctr. (LPE)							√	
USDA Healthy Homes Initiative		√						
USDA ARS						√	√	
USDA SARE						√	√	
US EPA	√	√	√	√	√	√		√
USGS	√	√						√
NOAA-Seagrant	√		√	√				√
National Drinking Water Associations		√						
Regional Chapters North Amer Lakes Mgmt Society	√							
Regional Chapters Soil and Water Conserv. Society	√							
Coop. Inst. Coastal & Estuarine Envion. Technol.			√					
Consort. of Inst. for Decent. Wastewater Treatment				√				
National Environmental Health Assoc.				√				
State-Level Partnerships:								
Ag Experiment Stations/State Extension Programs	√	√	√	√	√	√	√	√
University Water Resource Institutes	√	√						√
State Depts of Environmental Projection/Mgmt.	√	√	√	√	√	√	√	
State Drinking Water Agencies		√	√					
Local Partnerships:								
Local communities	√	√	√	√	√	√	√	√
Conservation Districts and RC&Ds	√	√				√	√	
Public & private schools	√	√			√			
Private sector professional organizations		√		√	√			
Native American communities	√							
Watershed and lake associations	√	√		√	√			√
Volunteer monitoring programs, local Trout Unlimited groups	√							
4-H groups or Master Gardeners					√		√	

Focus Area Outputs and Outcomes: Each focus area develops a LOGIC model, sets SMART objectives and identifies activities, outputs and outcomes. Each focus area has identified several outputs that will occur within the first portion of the project. Additional outputs will be defined over the grant cycle in response to leveraging opportunities and stakeholder needs. Below are

listed short- to mid-term outcomes and long-term outcomes that are common to all focus areas. Each focus area description lists additional examples of specific outcomes.

Common Short- to Mid-term Outcomes:

- Partner agencies and organizations engaged to provide new opportunities to address water quality and watershed protection.
- Regional and inter-regional communication, cooperation, collaboration and joint programming activities in research, education and Extension are cultivated and valued.
- Research, education and Extension gaps affecting stakeholder outcomes are identified.
- New water quality or watershed assessment and restoration initiatives are launched.
- Stakeholders identify and prevent pollution and health risks to water resources.
- Stakeholders, partners and students gain increased awareness, knowledge and training in LGU research, programs and educational resources and gain knowledge of and increase their use of water protection/restoration practices, tools and activities.

Common Long-term Outcomes:

- Relationships with environmental, governmental and industry organizations strengthened.
- Research, education and Extension become more integrated within regional focus areas.
- Funds, staff time and expertise are leveraged within and beyond the region.
- Watershed conditions and water quality are improved measurably. Nutrient and pathogen loading to water resources are reduced. Water availability relates to water demands.

Focus Area: Watershed Assessment

Situation: Decision-makers and landowners need accurate, "place-based" information on current conditions and risks to water quality, quantity and habitat to implement effective watershed planning and restoration. However, information at these scales is often absent, inaccessible or difficult to interpret by decision-makers and stakeholders.

Approach: This focus area will bring together LGU expertise, momentum and partnerships in field/watershed modeling and volunteer water quality monitoring to help decision makers, NRCS, land managers and producers identify critical areas for protection, pollution abatement and restoration. This focus area benefits from a number of ongoing CSREES projects (e.g., NRI, NIWQP Integrated and National Facilitation Grants) and can leverage efforts with considerable local, state and regional support. Our region will promote Extension-led volunteer water quality monitoring programs that encompass over 3,500 volunteers and address many local concerns, including bacterial contamination of shellfishing beds, lake eutrophication and riverine health. Volunteer monitoring data support local management and state efforts in 305(b) assessments and development of 303(d) reports, resource inventories, BMP and restoration evaluations and TMDLs. This focus area also promotes geo-spatial decision support models to target management practices on many scales. Cornell will expand the use of the Variable Source Area (VSA) hydrologic approach at the field scale to target specific "Critical Management Zones" to reduce the risk of pollutant loading. At the watershed scale, UNH's GIS Watershed Resources Inventory and Following the Flow NPS site assessment tool will be expanded to watershed associations and communities regionally. Rutgers will share outputs of the upcoming Multi-State Hatch project "SDC324: Modeling for TMDL Development and Watershed Based Planning, Management and Assessment". We will also incorporate social science results from regional NIWQP projects to improve stakeholder use of data-intensive information. In a cross-cutting role, this focus area will provide other focus areas approaches to target restoration and protection efforts to high value and high risk locations.

Stakeholders: Volunteer monitoring groups, NRCS, producers, local, state and regional government officials, watershed organizations, local chapters of organizations like Trout Unlimited, researchers, Extension and the shellfish industry.
Output Activities: Representative activities include:

- *Needs Assessment, Regional Planning:* Review stakeholder needs and identify activities and outputs needed and opportunities to exchange resources and incorporate new efforts.
- *Cross-cutting activities with other focus areas:* Generate training materials and curricula for use by other focus areas and their partners. In cooperation with NEMO, develop materials to improve the use of watershed assessment data by local decision-makers. Work with Sustainable Landscape focus area to target placement of rain gardens and shoreline buffers.
- *Research*: Develop refereed publications and tools to improve the identification and modeling of high risk source areas and critical nutrient sinks at local and watershed scales.
- *Educational Outputs*: Create experiential learning opportunities for undergraduate and graduate students in TMDL development and watershed assessment techniques.
- *Collaborative monitoring projects:* Faculty and volunteers evaluate, pilot and develop methods/training modules for low flow headwater streams and Bacterial Source Tracking.
- *Training Tools, Modules:* VSA hydrology model for targeting BMPs for NRCS and Certified Crop Advisors; use of monitoring data to foster watershed management; Restore-A-Waterway approach for watershed planning; developing TMDLs for antidegradation of high quality waters; and GPS/GIS web-based applications for shoreline assessment.

Focus Area Specific Short- to Mid-term Outcomes:

- Water quality monitoring and data user community understand approaches to water quality data collection, analysis and interpretation.
- Volunteer monitoring programs and watershed planners use data to identify water problems, design solutions and secure funding to implement solutions.
- Additional stream flow data incorporated into watershed assessments.
- Innovative indicators of human fecal contamination used in monitoring and watershed assessment protocols.

Focus Area: Drinking Water and Private Wells

Situation: Roughly 20 percent of the region's residents rely on private drinking water sources, such as private wells. These residents are responsible for the quality of their own drinking water and need to be aware of potential man-made and naturally-occurring contaminant risks to their drinking water sources and how to protect against such risks. Changing property laws and regulations in the region have increased demand for well water testing and educational materials.
Approach: The region's LGUs have a long history of effective programming in Home*A*Syst and source water protection for private drinking water supplies. Program delivery approaches use a mix of educational and research tools and methods (Home*A*Syst, Watershed Stewards, Master Gardeners, well water sampling). This focus area will build upon the New England Private Well Initiative's successes and expand into and incorporate efforts from Region 2. We will coordinate with Region 3's Master Well Owner Network (Stephanie Clemens, Coordinator) and explore piloting inter-regional programming opportunities.
Stakeholders: Private well owners, state and local health officials, municipal officials, well water professionals, realtors and environmental organizations.
Output Activities: Representative activities include:

- *Needs Assessment, Regional Planning*: Conduct regular regional needs assessment meetings to review progress to date, assess status of programs, identify gaps and revise LOGIC model.
- *Conferences*: Plan and host the biennial Private Well Water Symposium in 2009 and 2011. The Symposium will bring together private well protection professionals to communicate current research, programs and educational approaches that reduce risks associated with use of private wells. The Symposia will integrate research, Extension and education and involve other focus areas. We will strengthen the inter-regional participation in this event.
- *New Educational Programs, Demonstrations*: Adapt educational approaches from other regions, including down-well camera videos into presentations and on the web and the web-based Water Test Interpreter (University of Nevada). Revise and update private well testing brochure developed for Region 1 and adapt for Region 2.
- *Trainings, Workshops:* Offer training workshops targeted towards stakeholders. Topics include: proper siting, construction and maintenance of private wells; water quality testing and treatment; available financing; and appropriate rules and regulations for well development, maintenance and testing.
- *eXtension*: Serve on core leadership team for and coordinate regional resources into the eXtension Drinking Water and Human Health CoP proposed in March 2008 by the CSL.

Focus Area Specific Short- to Mid-term Outcomes:

- Private well owners will adopt practices to protect their private drinking water supply.

Focus Area Specific Long-term Outcomes:

- Reduce health risks associated with groundwater use to private well water users.
- Ensure groundwater resources for drinking water are of high quality and sufficient quantity.

Focus Area: NEMO (Nonpoint Education for Municipal Officials)

Situation: The region's patchwork landscape, combined with the lack of regional government, create a situation where local officials are the primary determinant of land use, with huge implications for watershed management in rural and agricultural watersheds.

Approach: The region's NEMO programs leverage considerable research expertise, including nationally recognized experts on topics as diverse as remote sensing, alternative septic systems, low impact development techniques and riparian nutrient dynamics. NEMO programs assist local volunteer policy makers to protect their water resources through research-based Extension on a wide range of watershed management topics and the use of geospatial tools (such as impervious cover estimates and nutrient loading models) that can assess, track and visualize land use patterns and their impacts. NEMO programs promote BMPs related to land use planning and site development. NEMO programs in CT, RI, NH, ME, VT, NY and NJ are members of the National NEMO Network, a 406-funded National Facilitation Project housed at UConn.

Stakeholders: Local land use officials, commissioners and professionals, landscape architects, engineers, town staff, land trusts, chambers of commerce, developers and contractors.

Output Activities: Representative activities include:

- *Needs Assessment, Regional Planning*: Conduct regular regional needs assessment meetings to review progress, assess status of programs, identify gaps, and revise LOGIC model. The first meeting will occur during NEMO U6 in fall 2008.
- *Conferences, Workshops:* Coordinate NEMO U6 – the conference of the National NEMO Network in Monterey, CA in October 2008. U6 will feature regional meetings, technical training sessions (many led by our region's NEMO programs) and network highlights.

- *Cross-cutting activities with other focus areas:* Explore connections to other focus areas. Work with the Watershed Assessment focus area at NEMO U6 to explore opportunities and methods to improve the use of watershed assessment data by local land use decision makers. NEMO will work with both the Watershed Assessment and Sustainable Landscapes focus areas to restore watershed and water quality via rain gardens and shoreline buffers.
- *Training Tools, Modules:* Help programs adapt locally derived assessment methods for regional use by creating educational resources and providing training. Examples include: the use and development of community resource inventory web tools, the regional Low Impact Development (LID) Inventory website (UNH Stormwater Center) and a LID training series.
- *Publications, Factsheets:* Develop regional educational materials and templates, such as a regional site plan review publication.
- *Collaborative demonstration, research projects:* In collaboration with a NIWQP funded integrated project, develop an environmental spatial decision support system (ESDSS) for local watershed managers to evaluate the extent and location of N pollution risks within stream reach ecosystems. The ESDSS will help decision makers and landowners target BMPs, e.g., intensive source controls or stream reach ecosystem restoration, or guide protection efforts in critical areas. Project social scientist will evaluate the tool and improve its usefulness for the target audience. This tool will be distributed through the National NEMO Network.

Focus Area Specific Short- to mid-term outcomes:

- Local decision makers and leaders understand the impacts of development on water quality and the need to protect critical natural resources while promoting community growth.
- NEMO participants collaborate at the watershed-scale with neighboring communities, implement natural resource-based planning and development design, and initiate new natural resource protection initiatives.

Focus Area Specific Long-term outcomes:

- Volume of runoff reduced and runoff becomes less polluted.
- Natural land becomes less fragmented and its aquatic habitat is protected and enhanced.

Focus Area: Onsite Wastewater Management

Situation: Onsite (decentralized) wastewater treatment systems serve approximately 25 percent of the US population. In rural and urbanizing watersheds of our region, sewers and centralized treatments typically are not available and onsite systems treat domestic wastewater. But, onsite systems often pose risks to environmental and public health due to poor soils and complications with siting, design, installation and maintenance. When systems fail, N, P and human pathogens enter surface and ground waters, degrading private wells, community drinking water supplies, lakes, rivers, estuaries, shell and fin fishing grounds and coral reef systems.

Approach: Major advances in innovative and alternative treatment technologies overcome many problems associated with onsite wastewater treatment. Proper selection, installation, use and maintenance of these technologies require new levels of sophistication among homeowners, surveyors, installers, designers and public health officials. Through funding from the New England Regional Water Program, Region 2 EPA and EPA headquarters, the New England Onsite Wastewater Training Program (NEOWTP), housed at URI, became the key regional center that provides training and expertise to these stakeholders. It works closely with a national network of Land/Sea Grant institutions in the Consortium of Institutes for Decentralized Wastewater Treatment (CIDWT) to generate and deliver a state of the science / engineering

portfolio of training materials. The NEOWTP will train stakeholders and evaluate appropriate alternative and innovative onsite wastewater systems for conditions throughout the region. We will participate in state/territory based needs assessments fostered by local Extension colleagues. We will work at the regional level with other partners outside of the LGUs.

Stakeholders: Soil and site evaluators, engineers, land surveyors, installers, operation and maintenance service providers, environmental health specialists, realtors, homeowners, state and community officials, Extension and government agencies.

Outputs Activities: Representative activities include:

- *Needs Assessment, Regional Planning:* Participate in regional needs assessments with regional professional organizations and Extension.
- *Cross-cutting activities with other focus areas:* Coordinate with the Island Initiative focus area to tailor programs to the stakeholders of the Caribbean Islands.
- *Conferences, Workshops:* Conduct hands-on classroom and field training for stakeholders throughout the region. Train-the-trainer programs, technology-based short courses, and other trainings will be conducted at the NEOWTP, regional conferences and off-site locations.
- *New Educational Programs, Demonstration:* In FY 09, the NEOWTP with the CIDWT will complete education materials and associated curricula on: i) Operation and Maintenance of Alternative and Innovative Systems for Service Providers; ii) Installation of Onsite Wastewater Treatment Systems; and iii) Glossary of Onsite Wastewater Terms. Future publications will reflect stakeholder needs.
- *Enhanced Land Grant Partnerships, Research Integration:* Initiate the development of a Northeast multi-state Research-Extension Hatch Project on "Alternative and Innovative Technologies for Decentralized Wastewater Treatment" to expand the LGUs capacity.

Focus Area Specific Short- to Mid-term Outcomes:

- Use of alternative and innovative system increases in high risk areas of the region.
- Stakeholder knowledge influences regulatory policy decisions related to onsite wastewater.

Focus Area: Sustainable Landscapes

Situation: Agricultural and forested lands are converting to residential development at a high rate in the region. Forested land can sequester nutrients more efficiently than developed land. Excess nutrients and pathogens in residential runoff pose a threat to human health and water quality.

Approach: Extension programs promote "smart" landscaping techniques that reduce polluted runoff and groundwater contamination by promoting infiltration and filtration. Extension methods include demonstration sites (rain gardens, native plant landscapes, low fertilizer and pesticide input lawns), publications, websites, workshops and involvement of trained volunteers including Master Gardeners. Research focuses on various aspects of buffer effectiveness and nutrient and water management. Social science research provides a foundation for understanding human knowledge, attitudes, values and behaviors related to landscaping and water quality and quantity protection.

Stakeholders: Homeowners, town officials, municipal workers, landscapers, growers, volunteers, watershed groups, garden clubs, and environmental organizations.

Output Activities: Representative activities include:

- *Needs Assessment, Regional Planning:* Identify common problems, review existing information needs assessment data, inventory existing programs, locate gaps, note programs of distinction, identify opportunities for collaboration and regional expertise and create mechanisms for regional collaboration.

- *Publications, Factsheets*: Develop and deliver regional educational materials and templates, including a bulletin of "new" lawn care recommendations, sticky labels for products to guide proper application and guidance manuals for rain garden installation.
- *Training, Internet Tools*: Develop and deliver electronic program activities and materials including websites, video, interactive computer programs and podcasts.
- *New Educational Programs, Demonstrations*: Develop and deliver participatory programs, such as demonstration sites, workshops and trainings. Work with Watershed Assessment focus area to target placement of rain gardens and shoreline buffers.

Focus Area Specific Short- to Mid-term Outcomes:

- Program participants become knowledgeable in how to reduce negative impacts from homes.
- Master Gardeners, professional landscapers, garden center owners, watershed groups and agencies trained by Extension promote water resource-friendly recommendations.

Focus Area Specific Long-term Outcomes:

- Reduced frequency and degree of water shortages from landscape management practices.

Focus Area: Water Quality and Agricultural Production

Situation: Agricultural lands in the region lie within compact, rural watersheds that contribute to drinking water supplies and high quality fresh and coastal water resources. Close proximity to high population densities, a high cost of living and a limited land base have prompted farmers throughout the region to intensify crop and livestock production as well as diversify and adopt alternative markets and practices. Agriculture in the region also has the opportunity to produce energy as ethanol and biodiesel. As farms bring Conservation Reserve Program land into production, water resources may be threatened with nutrient, sediment and pesticide inputs. A rise in organic agriculture has created a new opportunity to eliminate pesticide use but also created new challenges in managing nutrients. The need for profitable sustainable organic forage production systems is also an important regional educational and research priority. Threats to surface and ground water quality caused by agricultural intensification and diversification can be minimized by appropriate BMPs, effective nutrient and pest management and selection of water quality protective cropping systems.

Approach: Extension and its partners train farmers on research-based nutrient and pesticide management and animal waste management encouraging farmers to adopt new management systems. Working toward the goal of economically efficient production agriculture with minimal impact on water quality, we propose to: 1) research cropping systems that produce high quality forages with sustainable inputs, require minimal energy inputs and have manageable pest pressure to reduce the risks of offsite contamination from animal agriculture; 2) develop and promote improved nutrient management planning tools; 3) develop tools to help farmers know when nutrient applications are accurate; 4) educate consultants who work directly with farmers to adopt effective cropping systems; and, 5) initiate intra-regional discussion and grower training on agricultural water conservation.

Stakeholders: Farmers, agricultural service providers, NRCS, other agency staff, crop consultants and certified nutrient management planners.

Output Activities: Representative activities include:

- *Needs Assessment, Regional Planning*: Conduct regular regional needs assessments to review progress, assess status of programs, identify gaps and revise LOGIC model. Meet with regional crop advisors board to assess needs of and opportunities for training crop advisors.

- *Peer Reviewed Journal Articles:* Develop journal publications on current cropping system trials, including work on alternative cropping systems for organic dairy producers.
- *Trainings, Workshops*: Conduct annual summer and winter trainings for crop advisors, Extension, NRCS and other agency staff that incorporate results of regional research efforts. Conduct summer field day trainings on topics such as cropping systems for organic dairy farmers, agricultural water conservation and methods to reduce pesticide use.
- *New Educational Programs, Demonstrations*: Educational materials (training manuals and websites), programs (demonstration site farm tours) and approaches (farmer-led research groups) will be developed and incorporated into regional educational programs. Research results will be translated into Extension recommendations and workshops.
- *eXtension*: We will continue to develop the E-organic CoP on eXtension.
- *Educational Internships, Courses, Scholarly Curricula*: Extension and research findings will be incorporated into courses for undergraduate and graduate students in cropping systems science. Students will participate in demonstration research projects through both paid and for-credit internships.
- *Management Tools:* Extension will strengthen work that adapts and tailors the P-index by incorporating the mix of soils, topography, climate and nutrient sources within our region. We will incorporate improved nutrient testing methods into computer-based mass balance tools to help farmers develop and utilize nutrient management plans. We will improve nutrient testing methods, such as stalk and soil nitrate tests.

Focus Area Specific Short- to Mid-term Outcomes:

- Agricultural services providers, partners and students are trained to effectively assist farmers, land owners and residents with adoption of research-based BMPs.
- Stakeholders and partners adopt BMPs that protect and improve soil and water resources.
- Improved precision of nutrient applications.

Focus Area Specific Long-terms Outcomes:

- Measurable improvement in soil and water quality.

Focus Area: Small Farms Initiative

Situation: Small farm agriculture is a prevalent land use within our region and can be a significant source of water pollution. Most of these small farms do not fall under the EPA Concentrated Animal Feeding Operation regulations and its comprehensive nutrient management planning requirements. Often, they do not take advantage of assistance programs because of a lack of awareness or an inability to contribute requisite matching funds for capital improvements. Many of these farms operate in rural and urbanizing areas close to high density residential areas and water resources. The amount of land per animal unit is typically very small, resulting in problems with manure storage, handling and use. When improperly managed, these farms may contribute excess nutrients, bacteria and other pathogens, organic matter, sediments and odors to the environment. On these lands, erosion, sedimentation, loss of vegetation, loss of riparian buffers and private well contamination may occur.

Approach: This Initiative will combine existing work conducted within the region to strengthen efforts. Within the region, we have programs in place to assist small farms. For example, Cornell will share its work with small farms to improve feeding regimens as a cost saving method to reduce nutrient pollution. Rutgers will share its developing on-farm nutrient management certification program for small farmers and its assistance to horse manure producers in improving manure management techniques. UPR will share how it designs low cost manure

storage facilities for limited resource farms. The current Region 2 Water Program has contributed to LGU efforts in animal waste management by facilitating regional discussion and by providing resources to the LGUs to advance their work in this area. In 2007, URI received an extension education grant to develop an education program for small acreage livestock owners and managers focusing on pollution prevention BMPs.

Stakeholders: Farmers, agricultural service providers, NRCS, other agency staff, crop consultants, certified nutrient management planners and volunteer organizations like 4-H.

Output Activities: Representative activities include:

- *Needs Assessment, Regional Planning:* Conduct regular regional needs assessments to review progress, assess status of programs, identify gaps and revise LOGIC model.
- *Conferences, Workshops*: Train-the trainer series and demonstration tours on topics such as Nutrient Management Certification for Small Farmers; Small Farm Composting and Farm and Land Management. Series will focus on manure management, pasture management, water quality and animal management needs. Curricula will be developed for follow up meetings with farmers to help them complete their Nutrient Management Plans. Program evaluations will direct future priorities and efforts.
- *New Educational Programs, Demonstrations*: The Rutgers University Equine Science BMPs Farm will be used as a demonstration site for the region to educate small equine producers about farm management. Animal Waste Management certification module will be developed as an on-line short course. Complete a nutrient management planner computer program to be used by farmers. Coordinate regional factsheets on manure management.
- *eXtension*: Continue participation in the Livestock and Poultry Environmental Learning Center. Develop DVD series as eXtension CoP on manure and nutrient management.
- *Research, Publications:* Develop alternative management, disposal and use methods for manure, including manure use for energy and composting methods. Develop journal publications on manure management for horse farms.
- *Education Courses*: Incorporate Extension and research findings into undergraduate courses.

Focus Area Specific Short- to Mid-term Outcomes:

- Participation in on-farm nutrient management planning will increase.
- Target audience will consider water quality impacts when making livestock management decisions on their property and adopt BMPs to address identified pollution and health risks.
- Increased development and implementation of nutrient management plans on small farms.

Focus Area Specific Long-term Outcomes:

- Increased protection of community water resources on an individual level.
- Animal waste management systems contribute to economic and environmental sustainability.

Focus Area: The Islands Initiative

Situation: Puerto Rico and the Virgin Islands offer great opportunities to advance water management through our regional project. These islands contain 40 percent farmland and over 20,000 farms – ranking them among the upper 60 percent of US states and territories. Small livestock farms dominate the landscape and animal waste generates wide-spread problems. Onsite wastewater disposal does not meet modern standards and private potable water supplies are increasingly at risk due to growing demands and contamination of existing sources. The compressed nature of development provides great stress on the coral reefs, estuarine fisheries and drinking water supplies that are central to the economic and cultural well-being of the islands.

The link between rural and agricultural practices and degraded waters is apparent to residents and visitors alike and there is increasing demand for solutions.

Approach: An Islands Initiative, led by faculty at UPR and UVI, will harness the expertise of select focus areas to address stakeholder needs within the unique climate, geography and culture of these islands. Activities will build upon ongoing island-centered projects, funded through EPA Region 2 and the NIWQP, involving students and faculty in creating demonstration/training sites and Extension curricula. Initial progress in developing connections between UPR and UVI will be strengthened; where appropriate demonstration sites and training programs will be developed jointly and lessons transferred between islands. Grant funds have accelerated connections with programs at sister institutions of the Northeast including the New England Onsite Wastewater Training Center at URI and the Small Farms Initiative at Rutgers. These programs will assist the Islands Initiative to draw on expertise from national networks, including the Consortium of Institutes for Decentralized Wastewater Treatment and National Livestock and Poultry Environmental Learning Center.

Output Activities: Representative activities include:

- *Needs Assessment, Regional Planning:* In year one, identify common problems, review existing information needs data, inventory existing programs, locate gaps, note programs of distinction, identify opportunities for collaboration and regional expertise and create mechanisms for regional collaboration. Develop LOGIC models for programs, including: Onsite Wastewater, Drinking Water and Private Wells, and Small Farms Initiative. Stakeholders and performance-based outcomes will be defined within each LOGIC model. The Watershed Assessment focus team will explore approaches to systematically target high risk areas.
- *New Educational Programs, Demonstrations*: Develop and deliver participatory programs such as demonstration sites, workshops and trainings.
- *Inter-regional Activities*: Work with Regions 4 and 10 to initiate collaborations with the Coral Reef Task force. The Coral Reef Task Force has developed local action strategies (LAS) focused on coral reef conservation. We will work to coordinate efforts between Task Forces in the Caribbean and Pacific focused on effects of land-based pollution (including agricultural non-point sources) on coral reefs and barrier islands. This inter-regional coordination effort will be focused on developing and adapting effective LAS to protect coral reefs and barrier islands associated with tropical island ecosystems.

Regional Communication:

Regional Website: Kelly Addy, Web Coordinator since 2001, will lead the region's website efforts. We will synthesize and merge content from the two existing regional websites along with LGU resources into one cohesive regional website and ensure its linkages to the National Website. The website will communicate and connect the expertise, programs and tools within the region and present our programs in a coherent, organized framework to focus area participants, stakeholders, decision makers and partners. Research, education and Extension programs and activities within each focus area will be highlighted. Listings and links to contacts, partners and online resources will enable access to specific case studies, success stories, research projects, tools and information sources. We will research and incorporate information from CRIS searches and other relevant research in programs such as the NRI, Sea Grant and Water Resources Centers undertaken at regional LGUs. The website will list upcoming events, highlight topics of interest and provide easy navigation to individual state, regional and National web resources.

PROGRESS REPORT As per the National Program Leader, we have attached progress reports for Regions 1 and 2 as Appendix A.

STRENGTHENING THE CAPACITY OF THE NIWQP

National Leadership: Art Gold and Chris Obropta will continue active participation in the CSL. Art Gold will continue to chair the CSL Communications Standing Committee that develops the national website for the NIWQP.

National Program: Each LGU within our region will participate in the annual NIWQP conference. Focus areas are expected to cooperate with colleagues in the nation to facilitate theme-based information to strengthen NIWQP capacity to address its goals.

National Water Website: www.usawaterquality.org

Situation: In 2001 the CSL determined that the NIWQP and the LGUs need a platform to share and promote their work to leverage resources, foster program growth, gather support of partners and stakeholders and expand water quality and quantity improvement and protection efforts. Our region, through URI's Environmental Data Center, proposes to continue to host, populate and improve a National Website to foster communication and coordination within the National Network and among national and regional partners.

Approach: Since 2001, the New England Regional Water Quality Program, under the direction of Art Gold, Peter August and Kelly Addy, has hosted and developed the National Website, provided website development training and guidance to NIWQP projects and maintained listservs for the CSL. In 2007, the National Website received more than 204,000 requests for pages, with over 500 hits per day. We secured rights to the Internet domain into 2012. The website communicates and connects the products, expertise and programs within the NIWQP and presents them in a coherent, organized framework to stakeholders, decision makers and partners. We will: communicate successes and accomplishments of the NIWQP; strengthen the National Water Web Network; create agile, responsive and flexible web resources to meet the dynamic interests of the NIWQP; provide a stable and secure computing environment to develop and host the National Website; and administer four email listservs that promote communication within the NIWQP [WQ-L (for all CE water quality personnel and related parties), CSL-WQ (for CSL members), RLSLT (for Regional Liaisons) and 406developers (for website code & content developers)]. All aspects related to the National Website will be managed by Kelly Addy, Content Coordinator, and Aimee Mandeville, Technical Expert. We have budgeted approximately $55,000 annually to support this effort (see URI's budget notes.)

Output Activities: The web team will continue to serve as the gateway to the NIWQP. We will: maintain links to regional water quality programs and National Facilitation Projects; list and link to USDA CRIS records of all NIWQP funded projects; update the comprehensive contact information for all Extension water quality coordinators; and, maintain the calendar of National and regional water quality events. In addition, we will:

- *Provide a stable, secure, and accessible environment to host National Website:* The hardware, software and expertise for the website is housed and maintained in URI's Environmental Data Center where staff and facilities prevent web server downtime with comprehensive systems of onsite/offsite daily-incremental and weekly-full data backups and provide uninterruptible power services, redundant web server hardware and firewall and

virus security systems. We follow the guidelines of the WWW Consortium Web Accessibility Initiative and Section 508 of the Federal Rehabilitation Act.

- *Communicate successes and accomplishments of the NIWQP*: Most of the content on the National Website resides under CSREES' eight topical themes. We propose to: 1) expand content of remaining four topical themes (Environmental Restoration, Pollution Assessment and Prevention, Water Conservation and Agricultural Water Management, and Water Policy and Economics), and 2) update content on all expanded themes (Drinking Water and Human Health, Animal Waste Management, Watershed Management, and Nutrient and Pesticide Management). We will assemble a National panel of water experts, per recommendations from the CSL, to identify focus areas within the themes and review written content. We will review regional and state websites within the NIWQP Network and synthesize information collected by the CSL Reporting and Evaluation Subcommittee as well as the USDA CRIS database. We will highlight and link to example programs with an emphasis on accomplishments. Success Stories will detail how exemplary NIWQP projects have improved and protected water quality in the US. The research base (CSREES-funded, including NRI), educational programs and Extension activities will be described comprehensively in a nation-wide snapshot.
- *Develop, maintain and post the CSREES National Water Conference Proceedings:* The National Website contains over 2,000 searchable abstracts and poster/presentation files from 2004-2008. We will add online proceedings material after each National conference.
- *Strengthen the NIWQP Web Network*: The web team will lead the coordination and communication with the network's web content and code developers through its listserv, webpage featuring guidelines and recommendations generated to foster the development of effective websites and website development workshops at the CSREES National Water Conference. The National website serves as a content resource for regional and National Facilitation projects.
- *Provide Support for eXtension*: With its history of its theme-based compilation efforts and linkages to state, regional and National websites the National web team is poised to support efforts to deliver content through water resources eXtension CoPs. In particular, the organization, resources, tools and publications compiled and organized by the National Website will enhance the efficiency of teams engaged in creating these CoPs; a process currently in place via the proposed Drinking Water and Human Health CoP.
- *Website Assessment:* We will collect website usage statistics using multiple programs, compare and synthesize data collected and provide recommendations to the web network. Using web-based assessment tools, we will determine usefulness and adequacy of content, reason for use and accessibility of the National and Regional Websites. We will provide assistance to other regions in applying these assessment tools.

Outcomes

- NIWQP websites improve coordination, communication, education and the use of extension and research finding among members of the National Water Program network, partners and stakeholders.
- Water resource CoP's developed within eXtension using National Website resources.
- NIWQP accomplishments and successes widely distributed.