V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Climate Change: Water Quality Program

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
101	Appraisal of Soil Resources	10%			
104	Protect Soil from Harmful Effects of Natural Elements	10%			
111	Conservation and Efficient Use of Water	10%			
112	Watershed Protection and Management	10%			
133	Pollution Prevention and Mitigation	60%			
	Total	100%			

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	1.9	0.0	0.0	0.0
Actual Paid Professional	1.9	0.0	0.0	0.0
Actual Volunteer	0.0	0.0	0.0	0.0

2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
80000	0	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
80000	0	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
41478	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Trained local government agency personnel, maintenance professionals, community group and non-governmental organization representatives, and volunteers to deliver information on water quality protection to their respective audiences and the general public utilizing the V.I. Home & Farm Water Quality Assessment (VI*A*Syst) program.

Developed and disseminated locally-oriented outreach materials related to water conservation, drinking water protection, wastewater disposal and best management practices for pollution prevention for delivery through the VI*A*Syst program, with particular emphasis on materials targeted towards youth and under-served audiences.

Educated homeowners and renters about residential environmental management including use of least-toxic household products and non-point source pollution control to protect aquatic ecosystems utilizing VI*A*Syst materials.

Developed publications, workshops, and presentations that relay information on the issues of watershed protection, non-point source pollution control, drinking water protection, and wastewater disposal and best management practices to reduce impacts to the general public.

Utilized the media to promote Water Quality programs through various methods, including, but not limited to, radio and television PSAs, television video spots, local talk shows (radio & TV), and videotapes of workshops, presentations, and symposia.

Identified and developed technical materials related to water conservation, drinking water protection watershed planning, and non-point source pollution control practices and systems for use by policy-makers and regulatory personnel, and disseminate information related to these topics through the V.I. Non-point Source Newsletter, NPS Update.

Provided technical assistance on a variety of topics, including but not limited to, erosion, sediment, and stormwater control; xeriscaping - incorporating native, drought-tolerant plants into the landscape; watershed planning; water quality assessment; drinking water protection; and environmental assessment, to government agencies, community groups, various areas of the private sector, and the general public.

Conducted watershed studies utilizing oceanographic and GIS technology to Investigate Effects of Land-based Pollutants on Water Quality and Marine Resources in cooperation with other UVI components Conservation Data Center (CDC), CES , V.I. Experimental Program to Stimulate Competitive Research (VI EPSCoR) and Center for Marine and Environmental Studies (CMES). Project goals are to further scientific research, promote educational outreach and improve natural resource management programs.

2. Brief description of the target audience

Policy-makers and regulatory personnel, community groups, teachers and students, business community, non-governmental organizations, and the general public.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	600	2300	280	550

2. Number of Patent Applications Submitted (Standard Research Output)

Patent Applications Submitted

Year:	2012
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	1	0	1

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Education/Classes/Training in water quality protection and VI * A * Syst Program

Year	Actual
2012	1

Output #2

Output Measure

- Workshops / Presentations about water quality protection, less toxic household products and NPS BMP's through the VI * A * Syst Program, on-site waste water treatment, cistern care, and

watershed protection.

Year	Actual
2012	31

Output #3

Output Measure

- One on one consultations with residents, government employees, students

Year	Actual
2012	320

Output #4

Output Measure

- Tours of VI natural areas with students, community groups and others to raise awareness about watersheds and water quality protection.

Year	Actual
2012	4

Output #5

Output Measure

- Educational/research publications, articles, posters, newsletters, GIS maps related to non-point source pollution, on-site wastewater treatment, watersheds, VI * A * Syst, and protection of VI native plant communities.

Year	Actual
2012	3

Output #6

Output Measure

- PSAs

Year	Actual
2012	0

Output #7

Output Measure

- Fairs

Year	Actual
2012	8

Output #8

Output Measure

- TV/Media

Year	Actual
2012	6

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Awareness of the health risks associated with water quality impairment and water and wastewater treatment systems will increase, and 75 homeowners will consider installing or retrofitting their existing septic systems with improved packaged sewage treatment systems or alternative wastewater treatment systems.
2	Fifty (50) homeowners will request technical assistance with the evaluation of old septic systems; 20 homeowners will proactively pump their septic systems, and three (3) businesses will construct alternative wastewater treatment systems based on successful prototypes recommended by CES.
3	Educational materials, workshops, tours and other direct and indirect outreach methods will increase public knowledge of the characteristics and functions of aquatic ecosystems (guts, salt ponds, mangrove lagoons, bays and oceans) including their role within a watershed. Five (5) homeowners and/or natural resource managers will protect riparian and wetlands vegetation. Sixty five(65) clients will become aware of the VI laws protecting riparian and wetlands vegetation.
4	Requests for site visits and VI*A*SYST assessments and presentations will increase. 75 clients or more will each adopt at least one VI*A*Syst recommended practice such as the use of non-toxic household products, etc. Fifty (50) homeowners will improve cistern water quality by following CES recommendations.
5	At least twenty (20) clients will implement effective stormwater, erosion and sediment control practices and xeriscaping. Ten(10) VI Dept. of Public Works roadside maintenance crews will improve their roadside clearing methods to prevent soil erosion and sediment runoff.
6	Over 1000 VI youth will become aware of the vital connections between human activities and water quality, how land-based activities affect coastal water quality,and why watershed protection is important to them and their well-being. Youth and volunteer involvement in water quality protection and resource conservation will increase.
7	Information from watershed studies utilizing oceanographic and GIS technology will lead to five(5) specific recommendations for watershed residents and government agencies about how to reduce sediments and nutrients in stormwater runoff.

Outcome #1

1. Outcome Measures

Awareness of the health risks associated with water quality impairment and water and wastewater treatment systems will increase, and 75 homeowners will consider installing or retrofitting their existing septic systems with improved packaged sewage treatment systems or alternative wastewater treatment systems.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	2

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Nutrification and contamination of surface, groundwater and coastal waters from leaking septic systems is considered to be a major problem in the VI. Nonpoint Source Pollution from defective septic systems impacts human health and marine resources.

What has been done
Technical assistance was provided to a St. Thomas condominium homeowners association to facilitate the replacement of a defective septic system with a package onsite waste water treatment plant (OWTS). CES partnered the St. Croix Environmental Association, (SEA) the VI Waste Management Authority, and the VI Department of Planing and Natural Resources (DPNR)to educate the public about septic systems.

Results
Site plans for an alternative package OWTS were completed with assistance from CES.

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation

Outcome #2

1. Outcome Measures

Fifty (50) homeowners will request technical assistance with the evaluation of old septic systems; 20 homeowners will proactively pump their septic systems, and three (3) businesses will construct alternative wastewater treatment systems based on successful prototypes recommended by CES.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	37

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Developers and architects seek technical information from CES about alternative OWTS systems. The Virgin Islands Department of Planning and Natural Resources (DPNR) referred architects, businesses, developers to CES for specific technical assistance with alternative OWTS installations.

What has been done
CES helped coordinate a USVI Alternative Onsite Wastewater Treatment System Design Training Class conducted by instructors from URI Onsite Wastewater Treatment Demonstration Center in partnership with the VI Div. of Environmental Protection and Waste Management Authority. CES provided technical assistance to a condo manager and engineer designing a package OWTS for a St. Thomas condominium. CES provided developers and engineers with alternative OWTS information during site visits.

Results
Thirty-one septic system installers/service providers and VI government personnel participated in the 2-day Alternative Onsite Wastewater Treatment Design Training Class on St. Thomas. All training class evaluations were favorable and participants indicated that the training was useful to them. Based on CES technical assistance a developer and engineer are considering adopting CES recommendations regarding the installation of a large package plant OWTS on an environmentally challenging site. Homebuilders were provided with information about septic system design based on guidelines developed by CES WQ Regional Project partners from the URI Onsite Wastewater Treatment Demonstration Center.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation

Outcome #3

1. Outcome Measures

Educational materials, workshops, tours and other direct and indirect outreach methods will increase public knowledge of the characteristics and functions of aquatic ecosystems (guts, salt ponds, mangrove lagoons, bays and oceans) including their role within a watershed. Five (5) homeowners and/or natural resource managers will protect riparian and wetlands vegetation. Sixty five(65) clients will become aware of the VI laws protecting riparian and wetlands vegetation.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	45

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Through direct and indirect methods, government agencies, NGOs, resource managers, property owners, educators, students, researchers and architects/engineers require basic and technical information about riparian and aquatic ecosystems, including how these ecosystems function within watersheds and are impacted by human activities.

What has been done
CES contributes to VI Forest Stewardship Program reports containing information about locally protected watercourses and wetlands that are distributed to landowners. Wetlands/watercourse data from studies conducted with CES assistance were available on websites. CES provided research teams with requested information on VI salt ponds and wetlands. The VI League of Women Voters and CES made recommendations to Magens Bay Authority about the impacts of road construction near a mangrove lagoon. CES partnered with SEA, DPNR, and the Nature Conservancy to provide information to properly owned developers, nonprofit organizations about impact of human activities on watersheds.

Results
Information from a draft field guide of wetlands plants developed by CES for the VI Wetland inventory Project (funded in 2010 by VI Division of Environmental Protection) is being incorporated into a CES website titled Useful Native Plants in VI Habitats. Property owners

enrolled in the VI Forest Stewardship Program were required to follow recommendations about wetlands and watercourse protection stipulated in reports and plans developed for individual properties; property owners also learned about the watersheds where their properties are located. Researchers from the University of Puerto Rico and the Woods Hole Ocean Observatory utilized information provided by CES to conduct soil core sampling in St. Thomas-St. John salt ponds.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management

Outcome #4

1. Outcome Measures

Requests for site visits and VI*A*SYST assessments and presentations will increase. 75 clients or more will each adopt at least one VI*A*Syst recommended practice such as the use of non-toxic household products, etc. Fifty (50) homeowners will improve cistern water quality by following CES recommendations.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	10

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Custodial professionals, business owners, school students, the general public and the natural environment can be exposed to negative effects caused by the use of toxic household products. Many residents on rely on maintaining healthy cistern catchments for their water supplies.

What has been done
Through its VI*A*SYST program, CES continues to make numerous presentations to the VI population promoting the use of non-toxic household products for protecting human health and the environment. Presentations were made to school groups, church congregations, scouts, businesses, maintenance professionals, government agencies and environmental groups. Cistern care also is promoted in these presentations and during individual consultations.

Results
The VI*A*SYST presentations continue to be very popular with all segments of the VI community. After attending VI*A*SYST presentations, many individuals indicated that they would stop using

toxic household products. Several attendees have referred others to CES for information on non-household products also after the airing of the TV shows persons requested more information. I know that persons have been buying much more of the non-toxic products as many of the stores have run out from time to time.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
133	Pollution Prevention and Mitigation

Outcome #5

1. Outcome Measures

At least twenty (20) clients will implement effective stormwater, erosion and sediment control practices and xeriscaping. Ten(10) VI Dept. of Public Works roadside maintenance crews will improve their roadside clearing methods to prevent soil erosion and sediment runoff.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	20

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
To protect the V.I. environment, prevent economic loss and comply with governmental regulations, CES clients (resource managers, Public Works personnel, businesses, developers, environmental groups, property owners, etc.) need technical assistance with xeriscaping, stormwater erosion and sediment control.

What has been done
During site visits and phone consultations, CES provided several property owners, government regulators, resource managers and landscape specialists with information about control practices that mitigate soil erosion and sediment runoff, plant selections for xeriscaping and environmental landscaping. CES provided the St. Thomas Environmental Association and the Magens Bay Authority with information about what salt tolerant native trees could be installed along coastal Territorial Park roadways to slow stormwater runoff. A client who had a $80.000 dollar estimate for a retaining wall was advised about the installation of several terrances held in place with gabion baskets which he has since installed.

Results
With recommendations provided by CES, salt-tolerant native coastal trees were successfully planted along the access road to Smith Bay Territorial Park by Magens Bay Authority and the St. Thomas-St. John Environmental Association. A St. Thomas store located in the coastal zone incorporated drought tolerant native plants into a landscaping plan to be used in a building construction project. Clients who requested information about ?environmental landscaping? indicated that they would follow CES?s recommendations regarding specific plant selections for various habitats. CES participation in the VI Dept. of Agriculture Forest Stewardship and Forest Legacy programs contributed to the preservation of large areas of native forest in targeted watersheds. One developer of a major development project in the CZM zone indicated that they would incorporate Best Management Practices and native plant selections recommended by CES' hands on training was provided for stakeholders. He invited staff back to see what he had done and photos were taken.

4. Associated Knowledge Areas

KA Code	Knowledge Area
104	Protect Soil from Harmful Effects of Natural Elements

Outcome #6

1. Outcome Measures

Over 1000 VI youth will become aware of the vital connections between human activities and water quality, how land-based activities affect coastal water quality,and why watershed protection is important to them and their well-being. Youth and volunteer involvement in water quality protection and resource conservation will increase.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	180

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
VI youth and their instructors need basic scientific information about the unique connections between land and sea and how human activities affect water quality. With the rapid urbanization in the VI, the youthful population will be the most affected by land-use impacts degrading water quality.

What has been done
CES provided graduate students in environmental management programs with technical assistance and information relating to research projects. Publications co-authored or co-researched CES publications continued to be used for instruction by educators and librarians. CES designed educational displays to appeal to younger students. CES conducted field trips to the coastland terrestrial environments illustrations the connection between land-based and marine resources. Youths in Methodist Camp were lectured in the functions of wetlands and waste management. They were then taken on a tour of the landfill and wetland.

Results
UVI's Marine and Environmental Management Program and Yale's Coastal and Watershed Management Program graduate students utilized information provided by CES in watershed research projects on St. Thomas, focusing on water quality monitoring in impacted St. Thomas guts and watershed analysis pertaining to the affects of watershed activities on near shore resources, mainly coral reefs.

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management

Outcome #7

1. Outcome Measures

Information from watershed studies utilizing oceanographic and GIS technology will lead to five(5) specific recommendations for watershed residents and government agencies about how to reduce sediments and nutrients in stormwater runoff.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	3

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Watershed residents, government agencies, resource managers, other partnering academic institutions require scientific information utilizing oceanographic and GIS technology in order to

better understand the patterns of stormwater runoff and the impacts of sediment and nutrient-laden runoff.

What has been done
CES has been referring to GIS maps produced in previous projects (that CES co-researched) to understand hydrological flow on various properties (i.e., homeowner sites, territorial parks, hotel/public beaches) and to identify where fresh and salt ponds are located in order to respond to client requests.

Results
Hydrological flow of sediment-laden stormwater runoff into various St. Thomas bays was investigated using GIS maps. Maps increased understanding of flow patterns and where aberrations were occurring because of changes in the landscape (i.e., roads, sewers, parking lots, etc.). Property owners engaged in earth change operations were able to better understand the pattern and consequences of stormwater runoff on various landscapes. Researchers were able to access salt ponds/wetlands in more densely forested areas because CES could provide them with locations determined through the use of GIS maps.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

Turnover is high in some VI Government agencies, mainly due to political elections and recent fiscal constraints at the governmental level. It is difficult to establish very effective long-term relationships that can result in policy changes or effective training. Employees in these agencies acknowledge the need for more comprehensive enforcement of environmental laws, but they are overextended and need additional staff support to effectively enforce existing regulations. They also acknowledge the need to produce new regulations regarding the onsite wastewater system installation and protection of various native forest communities in watersheds. Political pressures can impede with enforcement and the development of new regulatory policies. DPNR-DFW, DEP, and CZM have developed long-term partnerships with CES resulting in workshops, grants, client referrals and resource management initiatives. CES continues its productive association with the local EPA office.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

CES communicated closely with VI governmental partners, NGOs, environmental groups and the business community. These clients responded favorably to the informal, mostly verbal, evaluation methods used by CES during all stages of program implementation. Post workshop evaluations were distributed, and evaluations were favorable. Research project reports and publications are peer-reviewed.

Key Items of Evaluation

All key items of evaluation were used.