

## CHAPTER 6. PUBLIC EDUCATION AND OUTREACH PROGRAM

Public education and outreach programs are some of the most cost effective best management practices (BMP's) that can be implemented to protect and improve water quality. The Christina Basin public education program is directed by the Chester County Conservation District with assistance by the Brandywine Valley Association (BVA). The public outreach program includes a series of demonstration BMP's designed to show progress, implement methods to reduce stormwater pollutant loads, and improve water quality in the Christina Basin. The following public education and demonstration BMP projects have been implemented to date for the Christina Basin Strategy:

- Public Education/Outreach Programs
  - Christina Basin Task Force
  - Christina Basin Tour of the Watershed
  - Christina Basin Brochure
  - Basin Scapes Homeowner's Guides
  - Storm Drain Stenciling Project
  
- BMP Demonstration Projects
  - Friendfield Farms Riparian Corridor Protection Plan (PA)
  - Hills of Sullivan Infiltration BMP (PA)
  - Pocopson Township Maintenance Building Infiltration/Wetland BMP (PA)
  - Modern Mushrooms Tree Plantation (PA)
  - East Marlborough Wetland Treatment (PA)
  - Hy Tech Compost and Mushroom Farm (PA)
  - Buck Run Riparian Planting (PA)
  - Buck and Doe Run Farms Reforestation Project (PA)
  - Buck Run Farms Riparian Planting (PA)
  - Sadsbury Township Stream Restoration (PA)
  - City of Newark Bioengineering Demonstration Project (DE)
  
- USDA-NRCS Conservation Activities
  - Pennsylvania
  - Delaware

### 6.1 PUBLIC EDUCATION/OUTREACH PROGRAMS

#### Christina Basin Task Force

During the summer of 1996, the Chester County Conservation District retained the Brandywine Valley Association (BVA) to oversee the Christina Basin Task Force public education and outreach efforts. One of the purposes of the Christina Task Force is to provide a central forum for discussion among watershed organizations, local stakeholders and public groups that represent the four watersheds in the Basin. The Christina Basin Task Force is chaired by the BVA and meets quarterly to discuss watershed programs along the Brandywine, Red Clay, White Clay Creeks and

the Christina River. The Task Force provides the public outreach function for the overall program. It promotes ownership in the Basin Program and allows opportunity for partnerships to be formed with other individuals and organizations that are not represented on the overall Basin Committee. Topics on the agenda include progress reports on the Christina Basin Water Quality Management Strategy and TMDL approach, review of NPDES discharge permit applications, subdivision development proposals and other issues that affect the Basin. In addition to Federal, State, and local agencies listed on the cover of this report, the Christina Basin Task Force includes the following public environmental organizations:

- Brandywine Conservancy
- Brandywine Valley Association
- Delaware Nature Society
- Green Delaware
- Wilmington River-City Steering Committee
- Red Clay Valley Association
- White Clay Watershed Association
- Christina Conservancy

Water purveyors and wastewater treatment operators invited to participate on the Christina Basin Task Force include:

- Delaware
  - Artesian Water Company
  - City of Newark
  - United Water Delaware
  - City of Wilmington
- Pennsylvania
  - Avondale Borough
  - Borough of Downingtown
  - City of Coatesville Authority
  - Downingtown Area Regional Authority
  - Philadelphia Suburban Water Company
  - West Chester Area Municipal Authority
  - West Grove Borough

#### Christina Basin Tour of the Watershed

The Christina Basin Task Force schedules an annual tour of the watershed to review demonstration projects and other conservation work. Members of the public and agencies are invited to attend the bus tours. Over 40 people attended each tour on dates in June, 1996 and September, 1997. The Task Force intends to sponsor another tour in early fall 1998.

#### Christina Basin Brochure

The BVA published a three-color brochure summarizing the Christina Basin Water Quality Management Strategy. The popular brochure includes a map of the watershed, mission statement, explanation of the Christina Basin, troubled waters, and contacts for members of the Committee. Over 1,000 brochures have been distributed at meetings, conventions, seminars and through the mail.

### Basin Scapes Homeowner's Guides

The BVA published a series of Basin Scapes Homeowner's Guides which advocate environmentally sound landscapes benefiting people, wildlife and the Christina Basin. The Basin Scapes Guides are adapted from the Chesapeake Bay "Bay Scapes" materials which advocate a "holistic" approach to watershed management through principles inspired by the relationships in the natural world. The Basin Scapes have become so popular that other areas like the Northampton County Conservation District (PA) have adapted the materials for their watershed. The color-coded Basin Scapes brochures provide information to homeowners on the following topics:

1. Basin Scapes for Wildlife Habit (Orange) - Recommends native trees and shrubs to attract species such as hummingbirds and butterflies.
2. Integrated Past Management (Yellow) - Encourages natural biological controls to control pests and reduce chemical pesticide use.
3. Conservation Landscaping (Purple) - Promotes landscaping management with natural lawn care and tree/shrub selection that work with nature to reduce pollution and enhance wildlife habitat.
4. Basin Scaping for the Long Term (Blue) - Incorporates native plantings in landscaping to minimize water use and lawn chemical use and provide cover and food for wildlife and reduce runoff.
5. Using Beneficial Plants (Green) - Lists the beneficial native plants that require less fertilizer and pesticides to reduce pollutants carried by rainwater.
6. Creating Landscape Diversity (Grey) - Advocates landscape diversity using ground covers, gardens, and hedges that increase infiltration and reduce runoff from land into local waterways.
7. Basin Scaping to Conserve Water (Tan) - Identifies opportunities to save and conserve water supplies in home landscapes.

The Chester County Conservation District sponsored a storm drain stenciling project to heighten public awareness about connection between illicit dumping and clean water. The CCCD prepared a stencil with a fish message which says "DON'T DUMP." In the Christina Basin, volunteers painted the fish message on street storm drains to remind everyone that nonpoint source pollution can harm aquatic life and humans. Volunteers were reminded that many home care lawn and garden products, if not applied correctly or disposed of properly, end up in the curb sidestorm drain. A door hanger was distributed to residences within the towns explaining where you can go to safely dispose and recycle this material. A "fish-shaped" door hanger was designed to remind the public that household chemicals, pesticides, fertilizers, used motor oil, and yard or pet wastes should never be dumped down the storm drain. Otherwise, debris, litter, and chemicals washed down storm drains ends up in local waterways like the Brandywine Creek. Over 300 storm drains were painted and 1500 fish messages have been distributed. The stenciling program attracted national attention and there were three requests from other organizations in the U.S. for information.

The following municipalities have participated in the Christina Basin Storm Drain Stenciling Project:

- West Chester Borough
- Parkesburg Borough
- Kennett Square Borough
- Avondale Borough
- Kennett Township
- West Goshen Township
- Uwchlan Township

## 6.2 BMP DEMONSTRATION PROJECTS

### Friendfield Farm

Located in the head waters of the East Bank of the White Clay Creek, in London Township, Pennsylvania, Friendfield Farm has a horse operation. Approximately 1000 feet of White Clay Creek runs through the property. The landowners working with Landscape Architect, Jessie Farrell, and Nurseryman, Jim Plyer, developed a riparian corridor protection plan, fencing for livestock exclusion, native tree plantation, and wetland enhancement protection Best Management Practices. A portion of the cost of the project was funded by Phase I of the Christina Basin Program.

### Hills of Sullivan

The Hills of Sullivan residential development is located along the Main Branch of the White Clay Creek in New Garden Township, Chester County. New homes are being developed on the hillside overlooking the creek. The local township along with developer, Judd Builders Inc., were concerned the typical stormwater management basin may cause more water quality impacts than the preconstruction overland flow conditions. As an alternative, most of the runoff from the lawn areas are diverted to a series of shallow level spreaders which cascade the stormwater safely off the hillside. Some infiltration takes place within the spreaders. Technical assistance was provided by the Christina Basin program.

## Pocopson Township

In 1995, Pocopson Township, Pennsylvania began constructing a new township garage along the banks of the Pocopson Creek in the Brandywine Watershed. Pocopson Township supervisors, known for trend setting, were not comfortable with just putting up a simple garage building. Working with L.A. Kelly Gutshall and Landstudies in Oxford, Pocopson installed an innovative system to control stormwater from the buildings and parking areas. Infiltration beds were designed to handle the majority of stormwater from the building. A basin was enhanced for water quality and wetland planting. A low maintenance species of native grass was established to minimize cost and staffing time. The Christina Basin Program funded a portion of the cost for this project.

## Modern Mushroom, Inc.

Modern Mushroom Farms, a leader in the agricultural industry for installing Best Management Practices for water quality, were working to resolve problems in using grass fields to spray areas with runoff water. Modern Mushrooms is situated along the Red Clay Creek in New Garden Township, Pennsylvania. Spray drift onto adjoining properties and frozen ground in the winter severely limited the use of one of their larger spray fields. A decision was made to establish a tree plantation on the field. A mixture of hybrid poplar and pine tree stock was planted in the late 1996. It is expected that once the trees are established the spray drift will no longer be a problem; the tree cover and drift will provide additional infiltration and the spray fields can be utilized in a limited capacity further into the winter. The Christina Basin Program provided partial funding for the plantings.

## East Marlborough Wetland Treatment

East Marlborough Wetland Treatment was a stop on the tour. The BMP project demonstrated alternative methods of municipal waste utilization by enhanced wetland treatment for domestic septage and land application of wastewater by Spray Irrigation. The township had many areas of failing on lot septic systems in and around Unionville and also new developments in which on site septic systems would not be acceptable. The system provides needed ground water recharge and was an alternative to traditional stream discharge of treated effluent.

## Hy Tech Compost and Mushroom Farm

The Hy Tech Compost and Mushroom Farm has been a cooperator with the Chester County Conservation District since the early 1980's. Located right next to the Avondale Sewage Treatment Plant and a tributary to the White Clay Creek, this fresh compost and mushroom growing operation installed wharf runoff controls, 2 recycle runoff water storage with monitoring wells, aerators to minimize odors, and other runoff BMP's. Hy Tech has also installed state of the art machinery to more efficiently aerate and hydrate raw materials used to make fresh mushroom compost. The machinery enables Hy Tech to shorten the composting timeframe and have a more consistent compost mix. The Needham Family and Hy Tech managers have been early supporters of the Chester County Conservation District's efforts to secure funding for the PL83-566 Land Treatment Program for the Red and White Clay Creeks watersheds.

### Buck Run Riparian Planting

Two landowners have been working in Buck Run, a tributary of the West Branch of the Brandywine Creek to improve the riparian buffers. Much of the land adjoining Buck Run has been protected by easements with the Brandywine Conservancy.

### Buck and Doe Run Farms

Art DeLeo is the owner of Buck and Doe Run Farms. Art has been a cooperator with the Conservation District since 1987. Art's goal is to reforest the land along the 15,000 lineal feet of creek with native deciduous trees. Prior to 1996, he has planted approximately 850 trees within the riparian area. As part of the Christina Basin program, an additional 800 mixed deciduous seedlings with tree mats were planted. Art worked with Natural Landscaping Nursery to establish the trees.

### Buck Run Farms

William Elkins of Buck Run Farms has also been a cooperator with the Chester County Conservation District since the early 1980's. With assistance from Tim Smail, NRCS, Bill was an early practitioner of rotational grazing and the use of warm season grasses for his beef herd. Bill has previously installed stream bank fencing, protected cattle crossings, and watering troughs on the farm. As part of the Christina demonstration, additional protection, improved stream crossings, and riparian area tree planting has been installed.

### Sadsbury Township Bert Rael Park Stream Restoration

Sadsbury Township supervisors requested assistance to stabilize severely eroded sections of streambank on Buck Run within the Township Park. This area has steep slopes adjacent to the creek, and the stream corridor is wooded. Much of the erosion has been caused by an adjacent railroad embankment, road runoff, and development in the upper reaches of the watershed. The NRCS is providing assistance. The project is stated to be completed by June 1998. It will be a combination of bioengineering and hard armoring to restore eroded streambanks.

### Newark Bioengineering Demonstration Project

The City of Newark, Delaware installed an experimental stream restoration (bioengineering project) along the Upper Christina River in Rittenhouse Park. The Upper Christina River experiences stream bank erosion which results in sedimentation/siltation, loss of habitat, and loss of trees. Stream erosion is a major contributor to downstream sediment loads. The bioengineering project was tried on an experimental basis to determine if native vegetation and other natural methods can be used to restore high velocity, Christina Basin streams in the Piedmont. If successful, the bioengineering methods can be applied to other stream reaches in the Christina Basin.

Funds for the Newark bioengineering project were obtained from the following sources:

DNREC Phase I Section 319 Grant  
USEPA TMDL Mini - Grant

Delaware Dept. of Agriculture, Forestry  
City of Newark Capital Budget

USDA - NRCS In - Kind Service	\$25,000
	\$10,000
Total	\$ 4,000
	\$10,000
	\$10,000
	\$49,000

The following agencies participated in the project:

Designed By: USDA Natural Resources Conservation Service  
Sponsored By: City of Newark  
Water Resources Agency for New Castle County  
New Castle Conservation District

Funded By: City of Newark  
USEPA, Region III  
Delaware Dept. of Agriculture  
Delaware DNREC

Once funding was secured, the USDA completed construction drawings in January, 1996. Approximately 500 linear feet of stream bank was treated with three experimental bioengineering techniques. At a cost of \$49,000 the average unit cost is \$100 per linear foot. The following bioengineering techniques were installed by stream volunteers and a contractor in April and May, 1996:

Vegetated Geogrid - Installed along 154 linear feet with rock at the toe bank with geotextile and live native cuttings installed at the top bank.

Brush Mattress - Installed along 85 linear feet and includes rock riprap at toe of bank with live planting brush mattress installed at the top of slope.

Double Fiber Roll - Installed along 240 linear feet consisting of a double row of coconut fiber logs stacked at the toe of the slope. Live willow cuttings were inserted into the coconut logs.

In May 1998, the bioengineering will be in place for 2 growing seasons. Table 6-1 provides a performance evaluation of the project. The results are mixed. Approximately 50% of the vegetation is thriving at the brush mattress and coconut fiber log sections. Less than half of the willow cuttings have survived at the vegetated geogrid particularly in shaded areas. Some of the lessons learned from this demonstration bioengineering project include:

- Select shade tolerant native species
- Restrict access by ducks and geese
- Delineate a 25-foot wide no-mow zone along the stream
- Use rock at the toe of slope and vegetation along the top of slope
- Store cuttings in a cold place and keep moist

### 6.3 USDA-NRCS CONSERVATION PROGRAM

The following Conservation BMP's were installed by the USDA-NRCS utilizing funding from the existing Federal Red Clay-White Clay PL83-566 program, Environment Quality Incentive Program (EQIP), Conservation Reserve Program (CRP), and District Cost-Share program.

#### Chester County, Pennsylvania

The following is a summary report of NRCS activities in the Christina Basin watershed in Chester County in the past year. Currently there are 36 preliminary requests for assistance in the PL83-566 program.

Red and White Clay PL83-566 Program Contracts are a total of 11 for 1469 acres-- \$559,000 in direct land treatment assistance.

Environmental Quality Incentive Program Contracts are a total of 9 for 994 acres-- \$32,881.00 in direct land treatment assistance.

Since the PL83-566 program started, the following practices have been completed:

Waste Storage Facilities	2
Critical Area Planting	9 ac.
Diversion	6,400 ft.
Grassed Waterways	4 ac.
Pond Seeding	2
Structure for Water Control	2
Subsurface Drainage	1,560ft.
Underground Outlet	750 ft.

Planned contract practices include:

Waste Storage Facilities	11
Compost Stacking Pads	7
Sediment Basins	2
Diversion	4,225 ft.
Filter Strip/Riparian Area	18 ac.
Grassed Waterways	7 ac.
Spray Irrigation System	19 ac.
Lined Waterways	450 ft.
Hayland Planting	287 ac.
Heavy Use Area Protection	24 ac.
Structures for Water Control	7
Nutrient Management Plans	1,529 ac.
Pest Management Plans	158 ac.
Tree Planting	20 ac.
Terraces	8,220 ft.

New Castle County, Delaware

The following list summarizes the NRCS and New Castle Conservation District conservation activities, both planned and under contract, for the Christina Basin watershed for the past year.

Red and White Clay Creeks PL83-566 Program

Hay planting	42.5 acs
Nutrient Management Plans	19.0 acs
Riparian Buffer Restoration	> 1 ac

I-EQIP

Agriculture Waste Structure  
Spray Irrigation System

Conservation Reserve Program

Private Lands 224 acs

District Cost Share Program

Water Control/Quality Structures  
Stream Bank Stabilization  
Wetland Pond Installation  
Manure Storage Structure  
Pasture Management

Conservation Practices Installed/Proposed - no Program Affiliation

Tree Planting	45 acs
Intensive Grazing/Waterway	30 acs
Agriculture Waste Structure	
Animal Waste Storage Structure	

## CHRISTINA BASIN STORM DRAIN STENCILING PROJECT

Because you live in the Christina Basin, which includes the Brandywine Red/White Clay Creek and Christina watersheds, volunteers are painting a fish message on your street's storm drains to remind everyone that nonpoint source pollution can harm aquatic life and humans.

Many products used in your home and on the lawn and garden, if not applied correctly or disposed of properly, end up in the curbside storm drain. Household chemicals, pesticides, fertilizers, used motor oil, and yard or pet wastes should never be dumped down the storm drain. These products make up the nonpoint source pollution generated by home owners.

### THE STORM DRAIN SYSTEM

Storm drain systems are designed to reduce flooding caused by rain storms. Unlike the sanitary sewer system which accepts sewage and transports it to a treatment plant, water from storm drains generally is not treated.

This means that debris, litter or chemicals washed down storm drains ends up in local waterways like the Brandywine!

Help protect Chester County's Waterways,  
State and National Scenic Rivers and the  
Home to Many Endangered Species!

For more information or to get involved with  
the Storm Drain Stenciling Project, please call:  
the Chester County Conservation District  
at (610) 696-5126 or the  
Chester County Health Department's  
Division of Solid Waste Management at  
(610) 344-5937.

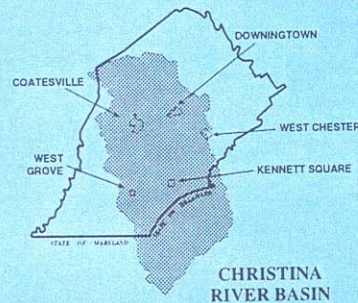


Figure 6 - 1 Storm Drain Stenciling Project, Chester County

**TABLE 6-1**  
**PERFORMANCE EVALUATION FOR NEWARK DEMONSTRATION**  
**BIOENGINEERING PROJECT**  
**Christina Basin Water Quality Management Strategy**

<b>Bioengineering Techniques</b>	<b>Length (LF)</b>	<b>Post Construction Condition</b>	<b>2-years After Construction</b>	<b>2-year Overall Condition</b>
Brush Mattress/ Rock Riprap	85	Vegetation thriving along top of slope. Rock riprap secure. No erosion.	Over 50% of vegetation thriving. Plantings observed at rock riprap. No erosion.	Good
Coconut Fiber Logs	240	Fiber Logs secure and in place. Willow cuttings not leafing out.	Sediment deposition behind fiber logs. Seedlings sprouting behind fiber logs. 50% of Willow cuttings not thriving.	Satisfactory
Vegetated Geogrid	154	Dead branches secured in place. No living vegetation observed.	Less than 50% of Willow cuttings thriving.	Poor

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