

Middle Conodoguinet Creek Watershed Rivers Conservation Plan

Executive Summary



Compiled by
The Pennsylvania Environmental Council

For the
Conodoguinet Creek Watershed Association

June 2004

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Executive Summary

I. Introduction & Background

The Conodoguinet Creek flows through Cumberland and Franklin counties of Southcentral Pennsylvania. From the Horse Valley next to Kittatinny Mountain at an elevation of 1680 feet, the Conodoguinet Creek flows 104 miles through the fertile Cumberland Valley of Pennsylvania, joining the Susquehanna River near Harrisburg. As it meanders north-eastwardly across a broad plain between Blue Mountain on the north and South Mountain on the south, the Conodoguinet flows through Buchanan State Forest and State Game Lands No. 76 then flows into Letterkenny Reservoir and changes course to a southeasterly flow. Coming from an Indian word meaning "a long way with many bends," the creek drains 524 square miles of diverse lands. Forested areas cover the upland basin, giving way to intense agriculture throughout the valley and rapidly expanding suburban areas downstream. The Conodoguinet meanders thru the suburban west shore of Harrisburg in a series of elaborate bends and loop where it meets the Susquehanna River.

The primary goal of this plan was to develop recommended management actions based on identified and prioritized problems and opportunities of water resource management inherent in the middle third of the Conodoguinet watershed. This was accomplished by first defining characteristics and resources of the study area, followed by identification of potential problems arising from both the static and dynamic characteristics of the area and by input from public meetings. The study concludes by presenting opportunities for implementable actions and recommendations for future study.

The recommended management actions encourage proper land use planning, including multi-municipal planning to address corridor-wide issues. Based on the growth potential of the corridor, increased development pressure is likely to occur. Heightened water quality and quantity related issues will likely affect the Middle Conodoguinet if not planned and managed carefully. This document is a resource to be used by the county and municipalities when creating and implementing land use plans and policies for the Middle Conodoguinet Creek corridor and watershed.

II. Project Area Characteristics

The River Conservation Plan covers a one-mile corridor on either side of the Conodoguinet Creek. The plan study area includes the middle portion of the Conodoguinet Creek watershed bounded by Alexanders Spring Creek, Green Spring Creek, Brandy Run, and Opossum Creek. This area includes all or part of the Borough of Newville, as well as, Upper and Lower Frankford, Upper and Lower Mifflin, West Pennsboro, North and South Newton, Southhampton, North and South Middleton, Dickinson, and Penn Townships in Cumberland County.

Land use within the project area is primarily agricultural. However, development pressure is encroaching into the watershed. The increasing population places additional demands for water supply and sanitary waste disposal, while producing

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increased amounts of stormwater and polluted runoff, which often causes water quality and quantity problems.

The local economy is diverse in nature, including agriculture, industry, and professional services. Economics in this area are often related to the transportation network, which centers in the middle of Cumberland County. Local facilities and infrastructure such as emergency services, schools, libraries, and waste disposal are provided for within the area.

III. Physical Features – Land and Water Resources

The study area is rich in land and water resources. There are sixteen tributaries located in the project area. The Conodoguinet Creek watershed lies within in the Great Valley section of the Ridge and Valley physiographic province, which is characterized as a series of twisted mountains and valleys. The mountains are comprised largely of erosion resistant sandstone and quartzite; valleys generally contain either shale or limestone as the underlying rock. The area's topography, soils, hydrogeology are uniquely arranged in both a karst environment, which means sinkholes, and an abundance of high quality farmland. The Creek itself has unique qualities that demonstrate the area's distinctive environment. Water quality within the study area has been studied through the Pennsylvania Department of Environmental Protection's Stream Assessment program and through local monitoring projects. Water quality and quantity are impacted greatly by the karst environment, agriculturally related pollution, and other point and non-point sources of pollution.

IV. Biological Resources

The study area has a number of biological resources, including the local ecological environment and wildlife habitat. Cumberland County is located west of the Susquehanna River and lies in the state's Ridge and Valley Province. The Project Area encompasses a mix of forest to the north, agriculture, small towns and suburbs. Development patterns in the county have been greatly influenced by the dominant features of the landscape itself. The Great Valley, incorporating central Cumberland County, contains the majority of the urban and intensely agricultural areas. However, Cumberland County still contains a patchwork of natural and human-dominated habitats, including cropland, pasture, young and old forests, ponds, streams, and rivers. These areas are used for hunting, fishing, hiking, birdwatching, and other activities, which make the region an attractive place to live. The same pieces of the landscape, which provide scenic and recreational opportunities, also function as habitat for a great diversity of plants and animals, including some, which are rare, threatened and endangered species. Cumberland County contains intact examples of natural communities and sites for species rare in the state or even globally rare.

V. Cultural Resources

From Paleolithic times to the early colonial period and up to the present day, the Conodoguinet has been an integral part of Cumberland County and its history. The fertile soils, level terrain, and the abundant and voluminous springs played an important role in the settlement of the Cumberland Valley. In the past the Conodoguinet has

served as a source of water, food, power for industry, a means for transportation, and as a place of natural beauty. Today its legacy lives on. Like so many places, current land use within the middle reaches of the Conodoguinet watershed was dictated by land use long ago. There are a large number of historic sites in the study area, including historic mills, homes, bridges, and archeological sites. In terms of recreation, there are several types of recreational facilities offering a variety of uses located within or adjacent to the middle reaches of the Conodoguinet Creek watershed and on the Creek itself. Greenways offer an important functional link between recreation systems. Connecting community places; parks, schools and nature areas, to the regional greenways and greenway links is done with functional links. There are three regional greenways located in the project area: the Conodoguinet Creek, the Cumberland Valley Rails to Trails corridor and Big Spring/Doubling Gap Run. These connect areas in Cumberland County with areas outside the county.

V. Community Input - Issues, Concerns, Constraints, and Opportunities

Community outreach included asking for input on issues, concerns, constraints, and opportunities within the watershed. Three public meetings were held during the plan process. The first was held to kick-off the plan and generally spread the word that the plan was underway. The Advisory and Technical Committee was created after the first meeting. In March of 2001, a letter was sent to the municipalities explaining the purpose of the plan and asking for further input on comments received at first public meetings. Two of the townships responded. In accordance with the plan process, the second public meeting was held as an informational review and input meeting on the plan process and the plan's draft goals and recommended actions. The third meeting was held to introduce the plan to the public and review the management options and recommendations. Another piece of the public participation was a community survey also completed as part of the public participation effort.

VI. Management Options and Recommendations

Based upon available resources identified through the planning process, several management options and recommendations have been developed to address the various issues, concerns, constraints, and opportunities within the Middle Conodoguinet Creek corridor. Recommendations include resource protection, land use issues, and habitat issues. Implementation of these recommendations will help restore, maintain, and enhance the Middle Conodoguinet Creek watershed. There are many agencies and organizations immediately available to assist in the Middle Conodoguinet Creek watershed with implementation of these recommendations. It is generally recommended that the Conodoguinet Creek Watershed Association, whenever possible attempt to identify and coordinate the many parallel efforts by various governments and other organizations doing work within the watershed.

A. Resource Protection

Several resources were recognized as areas that need additional protection, in terms of both point and non-point sources of pollution. Stormwater runoff, sinkholes, and sewage treatment plants/septic systems were identified in conjunction with use of best management practices and education regarding water quality issues.

General recommendations include overall reduction of pollution sources; such as industrial stormwater violators, high nitrogen and phosphorus permitted sources, and on-lot septic systems.

1. Agricultural Area Stormwater Runoff

There are several action items that can help control stormwater runoff from agriculture, commercial, and residential areas, including the following:

- Encourage maintenance of riparian buffers;
- Encourage municipalities to maintain grassy roadside buffers;
- Encourage Agricultural Best Management Practices;
- Encourage proper fertilization practices;
- Insure adequate waste product (manure) detention basins;
- Develop and enforce Nutrient Management Plans;
- Assess Sewage Sludge impact on watershed;
- Educate about best management practices (BMPs);
- Map sludge application sites and monitor application programs; and,
- Identify areas suitable for siting of intensive livestock operations.

2. Commercial/Residential Stormwater Runoff

Action items include implementation and enforcement of stormwater management plans, including requiring detention basins for commercial areas. Each municipality should adopt policies that require low discharge/high recharge Best Management Practices. In addition, there is a need to implement county stormwater management, inventory and assess impact of runoff from roadways and golf courses, impact of holding areas, work with DEP on regulated stormwater practices, and identify quarry locations within the watershed.

3. Sinkholes and Karst Environments

Since an inventory of sinkholes has already been made, education should be the main priority. Information on sinkhole locations and background information on sinkholes can be found on the DCNR website at www.dcnr.state.pa.us, under the Topographic and Geologic Survey. Booklet number Educational Series 11, "Sinkholes in Pennsylvania" is especially helpful for understanding sinkholes.

Given that run-off from hazardous materials spills moves quickly within karst environments, karst watersheds should be mapped before accidental spills using groundwater-tracing dyes that link recharge points to spring outflows. Dye tracing tests can be used to delineate general watershed boundaries for each spring and maps can be developed showing the potential affected areas. Emergency response crews should use these maps to determine where their efforts should be concentrated during spill cleanup.

4. Malfunctioning Sewage Treatment Plants/Septic Systems

Malfunctioning sewage treatment plants should be monitored for compliance with

treatment plant discharge limits. Education and promotion of funding for system repair should be targeted to on-lot septic problems. A process for monitoring small systems should be developed to more efficiently identify malfunctioning systems, and confirm corrections to failing systems. An educational program should be developed for municipalities and residents targeted on the watershed impacts of malfunctioning septic systems. Municipalities need to take action by requiring proper maintenance of septic systems. Creek should be monitored for signs of failing systems.

B. Land Use Issues

Watershed-based zoning/planning is a land use planning process that uses subwatershed boundaries as the basis for future land use decisions. It involves defining existing watershed conditions, measuring current and potential future levels of development, classifying subwatersheds based on the amount of future development, and modifying zoning and/or comprehensive plans to shift the location and density of future development to the appropriate subwatersheds. In situations where subwatershed boundaries cross municipal boundaries, municipalities are encouraged to take advantage of the new provisions in the Municipalities Planning code that permits them to band together to provide sites for development activities.

1. Aquifer Recharge Preservation

The most critical aquifer areas in the Middle Conodoguinet Creek watershed are in our limestone valleys. Our spring creeks are a great resource, but their waters have been affected by excess nutrients and their flows have been diminished. Protection of our limestone aquifers should be a major goal for the Middle Conodoguinet Creek watershed. See table 8 for more details. Replenishment of aquifers is critical so that we do not run out of water. Impervious surfaces, like pavement prevents precipitation from infiltrating into groundwater via the porosity of the underlying karst limestone structure. Prolonged droughts and pumping of wells may lower the water table and diminish springs and wells. Sinkholes and wetlands should be inventoried as part of the aquifer recharge/groundwater protection system.

2. Prime Agricultural Land Preservation

The Cumberland County agricultural land preservation programs have proven to be very attractive to a large number of landowners, thus creating long waiting lists. Cumberland County currently has a backlog of approximately 80 applications that involve 10,000 acres of land. Regardless of the structure of any agreement, there is a need for an additional source of funding. Out of economic necessity, some owners will be unable to wait for funding to become available and will sell or convert their land to nonagricultural uses. Recommendations include helping to secure funding for agricultural land preservation. The Plan also recommends working with farmers, developers, municipalities, legislators, and residents on protection of agricultural land. Farmland preservation is encouraged to the north side of the Conodoguinet Creek where it is better suited. Awareness programs should be developed to help educate about stream buffers, easements, and how to protect these areas.

3. Development Pressures/Small Scattered Developments

Development pressure exists throughout the Middle Conodoguinet Watershed. This development should be focused in areas with existing public water and sewer and should be encouraged as infill development in already developed areas. Local ordinances and easements should be promoted and sustained to protect sensitive areas. New development, including warehouses, should be monitored to assure need for the new development and for compliance with watershed regulations. An educational program should be created to promote sound development practices within the watershed. Sensitive areas along the creek should be mapped and used as a guide for land development. Developers and engineers/surveyors need to be educated about conservation subdivision design.

4. Landfills

New landfills should be placed in geologically stable areas. Compliance to regulations should be closely monitored at all existing landfills. Actions should include encouragement of legislation that gives local control over landfill locations and operations. Historic landfill sites, such as the one in North Middleton Township should be monitored. The Watershed Association should work with the Solid Waste Authority of Cumberland County, PA CleanWays Chapter, municipalities, and others on identifying problem dumping areas, cleaning up these areas, and developing an educational program for residents. The Association should also work with municipalities on their annual cleanups.

5. Lack of Zoning/Land Use Planning

Cumberland County is encouraged to complete a study for Conodoguinet Creek for stormwater management and land use planning practices. It is recommended that municipalities be encouraged to do joint planning and zoning, as well as, consistent planning between municipalities. Main goals of this would be to protect areas identified in the Cumberland County Greenways Plan and the Natural Resources Inventory, limit development in stream/riparian corridors, and in general protect sensitive areas. Increased education for municipal officials and the public should be developed on zoning/development issues. The Plan recommends working with municipalities on these recommendations, especially in ways that make watershed issues relevant to them. Enacting environmental advisory councils (EACs) is a recommendation on the individual or multi-municipal basis to help implement the action items in the plan and to be a liaison group between the watershed association and the local governments.

C. Loss of Fish and Wildlife Habitat and Lack of Stream Corridor Protection

There are a number of topics and recommended actions to improve and maintain sufficient and suitable habitat for the flora and fauna of the Conodoguinet watershed. Restoration of riparian corridors through implementation of BMPs, limitation of development in riparian corridors, and implementation of stream bank fencing programs will help to protect habitat. Problem areas within the stream corridor should be identified for streamside stabilization and streamside habitat areas, especially in areas

of sensitive species. Incorporation of greenways, protected linear corridors is encouraged where suitable to help protect stream corridors and habitat. Educational programs geared to landowners will help to increase awareness of appropriate practices within the watershed, including information on permits/regulations regarding activity in the stream corridor.

1. Forest Management

Stream margins are attractive timber sites. In a proper logging operation, some trees and other plants are left on both sides of a stream to provide a buffer strip 100 feet wide. Logging equipment must never enter the stream. Haul roads and skid trails requiring grading should be at least 150 feet away from the water and even farther away when logging on steep slopes.

To maximize the variety of animals in the woodland, create as many different stages of succession as possible. This is accomplished through timber harvests, fuel woodcuttings, timber stand improvement cuts, mowing, and plowing.

2. Field Borders

One of the most popular woodland management practices here is establishing field borders, a transition zone between field and forest. Field borders are strips of perennial vegetation at the edge of a field introduced by planting or converting from trees to herbaceous vegetation and shrubs. It is one of the most effective ways of increasing an area's potential for both wildlife diversity and numbers. A well-designed and maintained field border should provide a series of successively higher layers of vegetation in the transition zone between the field and the forest stand. The greater the number of distinct layers of vegetation represented in a field border, the more suitable an area is for supporting diverse wildlife populations. Wildlife food-producing shrubs should be retained.

3. Agricultural Lands

Agricultural lands account for the primary land use in the Cumberland Valley, and directly impacts the vegetative types that exist. These lands also determine what kind of wildlife habitat, and which species will be found there. Conservation practices must be carefully developed and evaluated so that wildlife habitat will become an integral component of the farm without sacrificing farm production.

a. Stripcropping, Contouring

Edges created by stripcropping offer attractive feeding and nesting sites and work best if a minimum number of fencerows, hedgerows, stonewalls, and other obstructions are removed. These vital travel and cover lanes contribute to greater use of cultivated acreage by farm wildlife species. Planting hay or food-bearing shrubs in field corners and where equipment use is restricted will provide additional wildlife food and cover. Areas maintained in sod provide nesting cover and enhance wildlife production, especially if mowing is delayed until July.

b. Conservation Tillage

Conservation tillage generally has a positive impact on wildlife. Using crop residues to protect cultivated fields during critical erosion periods provides food and cover for wildlife. Waste grains left on the surface with crop residues provide extensive feeding areas for wildlife during migration periods and over the winter months. Chopping or shredding cornstalks after harvest does ensure soil protection but it reduces the value of the land to wildlife. Crop fields left undisturbed after harvesting provide far better habitat. In addition to increased crop yields, research found substantially greater diversity and density of birds nesting in no-till row crop fields, and nest success was comparable to idle areas such as fencerows. Other studies indicate earthworm populations, which are vital to soil regeneration, tend to be vastly higher in no-till fields. Although most of the insecticides and herbicides in use today are short-lived chemicals that only persist in the environment for hours or days, increased pesticide use associated with no-till methods can impact wildlife negatively. Every farmer should seek help in establishing an integrated pest management system on his farm.

c. Grasslands

Grasslands, a common feature of the Pennsylvania landscape, are distributed as broad lowland plains in the Great Valley Section. Some grasslands are, in fact, old-field communities undergoing various stages of succession, reverting back to a forest community. Pastures and hay-lands should be managed to support both livestock and wildlife. This requires planning concerning vegetation types and uses. Because of growth characteristics of cool season grasses, they become dormant during the hot, dry summer - creating a slump in forage quality and quantity. Warm season species grow primarily in the warm part of the summer, and they thrive in hot temperatures. By using a combination of perennial cool and warm season grasses, farmers can rotate cattle on nutritious forage throughout the growing season. The clumpy growth form of these tall densely stemmed stands also makes these grasses attractive nesting and cover sites for wildlife species. Seasonal rotations of grazing or hay production allow wildlife to take advantage of warm season grasses for nesting and cover. Further, the later haying date for warm season grasses fits better into farmers' schedules, as early summer is typically less busy than mid or late spring. Warm season grass haying permits cutting at a time when forage quality is highest.

d. Corridors

Wherever practical, farmers should develop a system of wildlife travel lanes. These are narrow strips of cover connecting two separate clumps of cover or connecting the roosting or nesting cover with the feeding ground. They consist of brushy fence lines, strips of hay or grass and gullies of stream banks where there is a growth of shrubs, vines and weeds. A few feet around the outside edges of the hay or grain fields left uncut serve as good travel lanes and provide food during fall, winter and spring.

e. Farm Ponds

During the past 50 years, farmers and rural landowners built scores of small ponds to aid in water management and to provide a water supply that would not normally be available on the farm. Properly constructed and well-maintained farm ponds provide habitat for fish and associated aquatic organisms. Land surrounding the ponds can be developed into excellent wildlife habitat. Fruit-producing wildlife shrubs and conifers can be planted, and if livestock are kept away from the pond the resulting brushy vegetation will provide nesting cover. Pond islands offer protection from land predators and are preferred by nesting waterfowl. Nesting devices can be installed for a variety of animals.

f. Delayed Haymaking

Studies show that the “normal mowing schedule” destroys 90% of ringneck pheasant nests; therefore delayed haymaking is encouraged when practical. When delayed until after June 20, 34% of ringneck pheasant nests were successful. If delayed until after June 27, success might increase to 70 – 80%. This is equally important for bobolink, eastern meadowlark, upland sandpiper, grasshopper and savanna sparrows, and bobwhite quail populations.

g. Streambank Fencing

As livestock numbers increase, and operations become increasingly concentrated, nearby natural areas are often negatively effected. Runoff from cultivated fields, pastures and feedlots pollutes surface water by washing soil, fertilizers, and pesticides into nearby streams. When livestock trample stream banks, the soil is left unprotected and may collapse. Much of Pennsylvania’s water pollution is sediment that comes from soil erosion along stream banks that are grazed. One of the best ways for a farmer to prevent erosion and loss of productive land is to limit livestock access to stream banks. This also reduces contact with waterborne bacteria, and is the first step in developing a more productive pasture management system.

Streambank fencing is a low-cost, low-maintenance management tool readily available to any farmer. Additional benefits include food, cover, and nesting sites for birds and small mammals. Over 80 kinds of birds use streamside vegetation for summer feeding or nesting. It also improves fish habitat by enhancing water quality, providing protective cover, and increasing food for fish. Wildflowers and shrubs add shape and color, increasing the beauty of the farm landscape. Significant watercourses of the Project Area now have about 14,100’ of streambank fencing on 9 farms. There is a probable need of an additional 35,250’ on 23 farms.

4. Subdivision Design

Subdivision design should incorporate stream bank protection and wildlife travel corridors in the initial development of the development plan layout. A conservation concept plan should be part of the initial subdivision plan to preserve elements such as wildlife travel corridors as conservation areas, thereby excluding potential development in critical areas. An added benefit is that these wildlife corridors reduce the human/wildlife conflicts on highways and in suburban settings.

5. Wetlands

Despite their great importance to aquifer recharge and wildlife habitat, an alarming number of wetlands are lost each year to development. Wetlands should be restored, preserved or enhanced to protect the many species of waterfowl, furbearers, shorebirds, and songbirds that thrive in these areas.

6. Spring Seeps

Existing spring seeps should be protected, and all valuable mast-producing trees and shrubs in the vicinity of seeps should be retained. Encouragement of herbaceous vegetation around seeps and the planting of food shrubs or evergreen cover are desirable.

7. Non-native Flora and Fauna

Control of problematic, non-native species is necessary for the long-term maintenance of high quality natural systems. Discouraging the use of these and other potentially weedy exotics in and around natural areas can help to prevent further encroachment. Best control is through encouragement of growth of desirable species. Some nurseries now carry a selection of tree, shrub and herbaceous species that are native to Pennsylvania, and these are recommended where plantings are necessary in, or adjacent to, natural areas. The Vascular Flora of Pennsylvania (1993) is a helpful reference for determining whether a plant species is native to the state or not.

D. Enhancement through Public Education

Engage and educate individuals, communities, schools, and governments through outreach and education efforts associated with the other identified recommended actions. Educational programs should be targeted to all levels of the community and be distributed through websites, mailings, newsletters, workshops and individual personal contacts. Identifying interest in the Builders for the Bay program, a signage projects, and creek outings are also recommended.

1. Builders for the Bay Program

Promote municipal and county government participation in the Builders for the Bay Program. The program, formed under the leadership of the Alliance for the Chesapeake Bay, the Center for Watershed Protection, and the National Association of Home Builders, is aimed at reducing the environmental effects of residential and commercial development in the Chesapeake Bay Watershed. At this time, the Builders for the Bay Program is seeking local governments for participation in the program over the next two years.

2. School Outreach

Work with school district on programs involving all aspects of watershed planning. Curriculum could include nature, biology, culture, recreation, and other topics. School groups could partner with the watershed association and other groups on

various projects throughout the watershed. Development of a grant program to enhance school involvement is a potential action.

3. Signage for identification of creek at road overpasses

A signage project could be completed for the corridor in coordination with various watershed partners. Signage and wayfinding projects would increase knowledge of the Conodoguinet Creek's location and access points.

4. Creek Outings

Outings and gatherings on the Creek and its watershed should be encouraged, as participation in events increases the public's knowledge, appreciation and adoption of the Creek.

Management and Recommendation Actions			
ISSUE	RECOMMENDED ACTION	ACTION ORGANIZATIONS	PRIORITY
Resource Protection Issues			
Agricultural Area Stormwater Runoff	<ol style="list-style-type: none"> 1. Encourage proper fertilization practices 2. Encourage Townships to maintain grassy roadside buffers 3. Encourage agricultural BMPs 4. Encourage maintenance of riparian buffers 5. Identify optimum locations within watershed for large scale agricultural operations locations and ensure manure management plans are implemented appropriately 6. Implement heavy use BMPs 7. Identify sources of funding for BMP implementation 8. Develop and enforce Nutrient Management Plans 9. Map and assess sludge application sites permitted by DEP within one mile of creek; educate on the impact of Sewage Sludge; look at 	<ol style="list-style-type: none"> 1. Conservation District 1. PSU Cooperative Extension 1. Farm Bureau 2. Municipal Governments 2. Watershed Association 3. Conservation District 3. Farm Service Agency 3. PSU Cooperative Extension 4. Farm Bureau 4. Conservation District 4. PA Game Commission 5. Farm Bureau 5. NRCS 5. Conservation District 5. Watershed Association 5. Farmers 6. Farmers 7. Farm Service Agency 7. Conservation District 7. NRCS 8. Conservation District 8. Farmers 8. NRCS 8. Farm Bureau 9. Conservation District 9. Farm Bureau 9. PA DEP 	<ol style="list-style-type: none"> 1. M 2. L 3. H 4. M 5. M 6. H 7. H 8. M 9. M

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	<p>impact on creek specifically Route 641 area, hold informational workshops for residents and municipalities, review regulations, work with municipalities on this issue</p> <p>10. Coordinate education and information about BMPs to farmer organizations</p>	<p>9. Municipal Governments 9. Farmers</p> <p>10. PA Farm Bureau 10. Grange</p>	10. M
Commercial/Residential/ Industrial Stormwater Runoff	<p>1. Develop and enforce stormwater management plans; implement county stormwater plan</p> <p>2. Require on site stormwater detention basins for commercial sites</p> <p>3. Adopt ordinances that require low discharge/high recharge BMPs</p> <p>4. Assess impact of runoff from PA Turnpike, I-76</p> <p>5. Inventory and assess impact of holding areas throughout watershed, look at West Nile threat (Frytown Road, Potato Road)</p> <p>6. Inventory and assess runoff from golf courses within the watershed</p> <p>7. Identify and map quarry location and activity; monitor impact on watershed</p> <p>8. Correct flooding problem on Creek Road (near Deihl's Deli), recurring flood problem at dip in the road</p>	<p>1. Municipal Governments 1. County Government</p> <p>2. Municipal Governments</p> <p>3. Municipal Governments</p> <p>4. PennDOT</p> <p>5. Municipal Governments 5. Conservation District 5. PA DEP</p> <p>6. Conservation District 6. PA DEP 7. Watershed Association 7. Municipal Governments 7. Conservation District 7. PA DEP</p> <p>8. PennDOT 8. Municipal Governments 8. Conservation District</p>	<p>1. H</p> <p>2. M</p> <p>3. M</p> <p>4. M</p> <p>5. M</p> <p>6. L</p> <p>7. M</p> <p>8. M</p>
Sinkholes	<p>1. Inventory major sinkhole areas</p> <p>2. Educate farmers on nutrient/herbicide loss through sinkholes</p>	<p>1. County Planning Commission 1. USGS</p> <p>2. PSU Cooperative Extension 2. Conservation District 2. Farm Bureau</p>	<p>1. M</p> <p>2. H</p>

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	<p>3. Educate public on potential problems associated with using sinkholes as refuse disposal sites</p> <p>4. Outreach and education to community groups and municipalities on standards regarding sinkholes, especially on sinkhole development and stormwater management to prevent sinkhole problems</p>	<p>3. Conservation District</p> <p>3. Watershed Association</p> <p>4. PA DEP</p> <p>4. Watershed Association</p> <p>4. Municipal Governments</p> <p>4. Conservation District</p>	<p>3. M</p> <p>4. M</p>
Malfunctioning Sewage Treatment Plants/Septic Systems	<p>1. Monitor compliance with treatment plant discharge limits</p> <p>2. Educate public (municipalities and residents) on impact of malfunctioning septic systems, through newsletters and letter mailing</p> <p>3. Promotion of funding sources for individual septic system repair</p> <p>4. Develop process for monitoring discharge from "package" systems</p> <p>5. Educate public on alternative systems for individual lots and small communities</p> <p>6. Develop and enforce Act 537 Plans</p> <p>7. Encourage proper pumping and maintenance of septic systems</p> <p>8. Inventory municipal ordinances and enforcement for pumping and maintenance of septic systems</p> <p>9. Adopt municipal ordinances requiring regular pumping and maintenance of septic systems, every 3-4 years; work with sewage enforcement officers on ordinance enforcement</p> <p>10. Develop creek monitoring program to look for</p>	<p>1. PA DEP</p> <p>1. Watershed Association</p> <p>2. Municipal Governments</p> <p>2. PSU Cooperative Extension</p> <p>3. Municipal Governments</p> <p>3. Watershed Association</p> <p>4. PA DEP</p> <p>4. Municipal Governments</p> <p>5. County Planning Commission</p> <p>5. PA DEP</p> <p>5. Watershed Association</p> <p>6. Municipal Governments</p> <p>7. PA DEP</p> <p>7. Watershed Association</p> <p>7. Municipal Governments</p> <p>8. Watershed Association</p> <p>8. Municipality</p> <p>8. PA DEP</p> <p>9. Municipal Governments</p> <p>9. Watershed Association</p> <p>9. PA DEP</p> <p>10. Watershed Association</p>	<p>1. H</p> <p>2. L</p> <p>3. M</p> <p>4. M</p> <p>5. L</p> <p>6. H</p> <p>7. M</p> <p>8. M</p> <p>9. M</p> <p>10. M</p>

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	signs of malfunctioning systems and report to municipalities	10. Conservation District 10. Municipal Governments 10. PA DEP	
Water Withdrawals	1. Monitor and assess the impact of water withdrawals from the creek, both public and private entities	1. PA DEP 1. Municipal Governments 1. Conservation District	1. L
Land Use Issues			
Aquifer Recharge Area Preservation	1. Identify prime recharge areas and provide protection; enact ordinances to protect these areas 2. Direct development away from recharge areas 3. Encourage donation of development rights in prime recharge areas 4. Limit creation of impervious surfaces in recharge areas 5. Identify point and non-point pollution sources 6. Develop management strategies to reduce pollutant levels 7. Encourage proper forest management 8. Develop educational fact sheet on do's and don'ts of protecting groundwater within the watershed 9. Assess quantity of water withdrawals from watershed, especially by golf course and municipal water systems 10. Inventory and map specific sinkholes and wetlands as they relate to aquifer recharge	1. County Commissioners 1. USGS 2. County Planning Commission 2. Municipal Governments 3. Watershed Association 3. Land Trusts 3. Farm Bureau 4. Municipal Governments 5. PA DEP 6. PA DEP 6. Conservation District 7. Bureau of Forestry 7. Conservation District 8. Watershed Association 8. Capital Region RC&D 9. Conservation District 10. PA DEP 10. Municipal Governments	1. H 2. M 3. M 4. H 5. M 6. M 7. M 8. M 9. L 10. M

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	areas, utilize DEP and NWI mapping, land use maps, township maps, existing development maps to complete inventory	10. County Planning Commission 10. Conservation District	
Prime Agricultural Land Preservation	<ol style="list-style-type: none"> 1. Develop additional funding sources for existing program 2. Develop transfer of development rights program; work with South Middleton Township on this 3. Encourage donation of development rights 4. Encourage multi township planning and zoning 5. Adopt, maintain, and where appropriate, strengthen agricultural zoning; work with farmers to determine acceptable agricultural zoning 6. Require developers to provide infrastructure required to service new developments 7. Support revisions to tax code to reduce dependence on real estate tax 8. Develop educational program on the benefits and opportunities of agricultural preservation 9. Focus agricultural preservation easements and activities to the north side of the Conodoguinet Creek 10. Utilize multi-municipal planning as a way to 	<ol style="list-style-type: none"> 1. County Commissioners 1. Land Trusts 1. Watershed Association 2. County Commissioners 2. Municipal Governments 3. Land Trusts 3. Watershed Association 3. County Commissioners 4. County Planning Commission 4. Watershed Association 5. Municipal Governments 6. Municipal Governments 6. County Commissioners 7. Watershed Association 7. Farm Bureau 8. Watershed Association 8. Conservation District 8. Farm Service Agency 8. PSU Cooperative Extension 8. Farmers 9. Municipal Governments 9. County Planning Commission 9. County Conservation District 9. Farmers 10. Municipal Governments 	1. H 2. M 3. M 4. H 5. M 6. H 7. H 8. M 9. H 10. M

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	<p>help preserve agricultural land</p> <p>11. Petition state representatives to support of agriculture preservation and other issues</p> <p>12. Work with landowners along stream on education and implementation of conservation techniques, include information on conservation easements and buffers to protect stream corridor</p> <p>13. Work to educate and promote small farms; examine "right to farm" for small farms, and encourage BMPs on small farms</p>	<p>10. County Planning Commission</p> <p>10. DCED</p> <p>11. Watershed Association</p> <p>12. Watershed Association</p> <p>12. Conservation District</p> <p>12. Heritage Conservancy</p> <p>12. Municipal Governments</p> <p>13. Conservation District</p> <p>13. Farmers</p> <p>13. PSU Cooperative Extension</p>	<p>11. L</p> <p>12. H</p> <p>13. M</p>
Development Pressures/Small Scattered Developments	<p>1. Focus development in areas with public water and sewer</p> <p>2. Promote local ordinances/easements that protect sensitive areas</p> <p>3. Encourage fill in of open sections in already developed areas</p> <p>4. Develop educational materials and distribute to developers within the watershed</p> <p>5. Review new warehouse development; assure compliance, encourage reuse of existing space, and assure the need for the new development</p> <p>6. Study air quality issues and impact on the watershed relative to the trucking industry, Route 81 corridor, and emissions regulations</p> <p>7. Map sensitive areas along creek or coordinate use of existing mapping of sensitive areas along</p>	<p>1. Municipal Governments</p> <p>1. County Planning Commission</p> <p>2. Watershed Association</p> <p>2. Municipal Governments</p> <p>3. Municipal Governments</p> <p>3. County Planning Commission</p> <p>4. Municipal Governments</p> <p>4. County Planning Commission</p> <p>4. Watershed Association</p> <p>5. County Planning Commission</p> <p>5. Watershed Association</p> <p>5. Municipal Governments</p> <p>6. PA DEP</p> <p>7. County Planning Commission</p>	<p>1. H</p> <p>2. M</p> <p>3. H</p> <p>4. M</p> <p>5. H</p> <p>6. L</p> <p>7. M</p>

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	<p>the stream; use this information to make better land use decisions within the watershed</p> <p>8. Educate developers and engineers/surveyors about conservation subdivision design</p>	<p>7. Conservation District 7. PA DEP 7. Watershed Association 8. County Planning Commission 8. Natural Lands Trust</p>	8. M
Landfills/Solid Waste Management	<p>1. Site landfills in geologically stable areas 2. Monitor compliance with compaction and discharge limits 3. Encourage legislation that gives local control over landfill locations</p> <p>4. Assess impacts from historic landfill in North Middleton Township 5. Work with Solid Waste Authority of Cumberland County on education and outreach, evaluate drop-off centers locations and adequacy of curbside pickup programs 6. Identify/map illegal dumps and encourage cleanup and education on illegal dumping</p> <p>7. Complete municipal inventories of debris in creek (i.e. Middlesex Township example, near bridges); develop cleanup program for litter left near camping and picnic areas along creek</p> <p>8. Send information to new residents on waste disposal, illegal dumping, watershed, and what they can/can't do in the creek (i.e. tree falls/stream banks)</p>	<p>1. PA DEP 2. PA DEP 2. Watershed Association 3. Municipal Governments 3. Watershed Association 3. Farm Bureau 4. PA DEP 4. Municipal Governments 5. Watershed Association 5. Solid Waste Authority of Cumberland County</p> <p>6. Solid Waste Authority of Cumberland County 6. County PA CleanWays Chapter 6. County Conservation District 7. Solid Waste Authority of Cumberland County 7. County PA CleanWays Chapter 7. Municipal Governments 8. Solid Waste Authority of Cumberland County 8. County PA CleanWays Chapter</p>	<p>1. H 2. H</p> <p>3. L</p> <p>4. L 5. L</p> <p>6. M</p> <p>7. L</p> <p>8. M</p>

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	<p>9. Identify municipalities that hold regular cleanups and work with them to advertise through newsletters and getting information to residents (Lower Frankford Township example opportunity to get information out jointly with the watershed association; West Pennsboro does annual cleanup)</p>	<p>8. Watershed Association 8. Capital Region RC&D 9. Watershed Association 9. Municipal Governments</p>	9. M
Lack of Zoning/Land Use Planning	<p>1. Encourage townships to engage in joint planning/zoning efforts (integrate plan with current multi-municipal planning effort underway, eight municipalities in eastern part of watershed)</p> <p>2. Protect areas identified in Cumberland County Greenways Plan</p> <p>3. Limit development in stream/riparian corridors</p> <p>4. Encourage zoning that protects sensitive areas identified in County Natural Resources Inventory (i.e. buffers, open space, stormwater, etc.); implement zoning in every municipality</p> <p>5. Increase educational programs on zoning/development issues</p> <p>6. Provide copy of this Conservation Plan to all municipalities for integration into local planning practices; present the Conservation Plan to each municipality targeting supervisors and planning commissions</p> <p>7. Encourage consistency in planning between municipalities within the watershed</p> <p>8. Develop and implement zoning ordinances in</p>	<p>1. Watershed Association 1. County Planning Commission</p> <p>2. Municipal Governments 2. County Commissioners 3. Municipal Governments 4. Watershed Association 4. County Planning Commission 4. Conservation District 5. PSU Cooperative Extension 5. Conservation District 5. County Planning Commission 6. Watershed Association 6. County Planning Commission</p> <p>7. County Planning Commission 7. Municipal Governments 8. County Planning</p>	<p>1. H</p> <p>2. M</p> <p>3. H</p> <p>4. M</p> <p>5. M</p> <p>6. H</p> <p>7. M</p> <p>8. L</p>

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	<p>municipalities that currently do not have zoning</p> <p>9. Encourage implementation of model conservation type development ordinances; current project in Middlesex Township as example of model development</p> <p>10. Work with and engage the municipalities by making watershed issues relevant to them</p> <p>11. Implement Environmental Advisory Councils on an individual or multi-municipal basis as a means to implement Conservation Plan and to develop partnership between municipalities and watershed association</p> <p>12. Encourage Cumberland County to do a detailed study of Conodoguinet Creek for stormwater management and land use planning methods</p>	<p>Commission</p> <p>8. Municipal Governments</p> <p>9. County Planning Commission</p> <p>9. Municipal Governments</p> <p>10. Municipal Governments</p> <p>10. Conservation District</p> <p>11. Municipal Governments</p> <p>11. Watershed Association</p> <p>11. Pennsylvania Environmental Council</p> <p>12. County Planning Commission</p> <p>12. PA DEP</p> <p>12. DCED</p> <p>12. Municipal Governments</p>	<p>9. M</p> <p>10. H</p> <p>11. M</p> <p>12. L</p>
Habitat Issues			
Loss of Fish and Wildlife Habitat	<p>1. Restore degraded riparian corridors</p> <p>2. Limit development in riparian corridors</p> <p>3. Implementation of existing greenways plan</p> <p>4. Encourage enrollment in CREP program</p> <p>5. Education and workshops to landowners on a series of topics within the corridor: sound planting</p>	<p>1. PA Game Commission</p> <p>1. Conservation District</p> <p>1. FSA</p> <p>1. Landowners</p> <p>2. Municipality</p> <p>3. County Commissioners</p> <p>3. Municipality</p> <p>4. Conservation District</p> <p>4. FSA</p> <p>4. PA Game Commission</p> <p>5. PA Game Commission</p> <p>5. Conservation District</p>	<p>1. M</p> <p>2. H</p> <p>3. M</p> <p>4. M</p> <p>5. M</p>

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	<p>and other practices, riparian buffers, shad restoration activities, CREP program, Heishman's Mill Bypass Project</p> <p>6. Publicize Water Quality Management Data in educational/awareness format, history of stream water quality over time, location in stream</p> <p>7. Identify project areas for the construction of streamside stabilization and streamside fish habitat areas</p> <p>8. Cooperate with PA Game Commission and PA Fish and Boat Commission to identify and encourage protection of greenways of regional significance for the benefit of fish and wildlife protection; Greenways allow safe movement of fish and wildlife along stream corridors</p>	<p>5. Watershed Association</p> <p>5. PA Fish and Boat Commission</p> <p>6. PA DEP</p> <p>6. Conservation District</p> <p>6. Watershed Association</p> <p>7. Conservation District</p> <p>7. PA Fish and Boat Commission</p> <p>8. PA Game Commission</p> <p>8. PA Fish and Boat Commission</p> <p>8. DCNR</p> <p>8. Conservation District</p>	<p>6. M</p> <p>7. M</p> <p>8. M</p>
Lack of Stream Corridor Protection	<p>1. Publicize subsidized stream bank fencing programs</p> <p>2. Find additional sources for funding stream bank fencing programs</p> <p>3. Map degraded riparian buffers</p> <p>4. Publicize benefits of riparian corridor protection and restoration</p> <p>5. Protect corridor and habitat through sound practices in forest management, field borders, agricultural lands, subdivision designs, wetlands,</p>	<p>1. PA Game Commission</p> <p>1. Conservation District</p> <p>1. Watershed Association</p> <p>1. FSA</p> <p>1. NRCS</p> <p>2. PA Game Commission</p> <p>2. Watershed Association</p> <p>2. FSA</p> <p>3. Bureau of Forestry</p> <p>3. PA Game Commission</p> <p>3. Conservation District</p> <p>4. PA Game Commission</p> <p>4. Conservation District</p> <p>4. Farm Bureau</p> <p>4. Bureau of Forestry</p> <p>5. Conservation District</p> <p>5. Farm Bureau</p> <p>5. Watershed Association</p>	<p>1. M</p> <p>2. M</p> <p>3. M</p> <p>4. H</p> <p>5. M</p>

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	<p>spring seeps, and non-native flora and fauna</p> <p>6. Educate public about permitting regulations for streambank and streambed activity; particularly in terms of maintenance of banks and removal of debris (such as trees, etc.)</p> <p>7. Enhance stream corridor protection through development of debris and sewage monitoring/clean up programs</p>	<p>5. County Planning Commission</p> <p>6. PA DEP</p> <p>6. Conservation District</p> <p>6. Watershed Association</p> <p>7. Conservation District</p> <p>7. PA DEP</p> <p>7. Watershed Association</p> <p>7. Municipal Governments</p>	<p>6. H</p> <p>7. M</p>
Education			
We All Live Downstream	<p>1. Develop and implement educational programs to all levels of the community; should include interconnection concepts of the watershed approach; enhance all levels of communication between the many entities working within the watershed; work to identify sources of funding for development of educational programs</p> <p>2. Work with local school districts on involving students through activities and curriculum</p> <p>3. Develop educational materials on stream cleanups, riparian buffers, easements and tax benefits, lawn fertilizer nutrients, invasive species, etc.</p> <p>4. Develop education materials and programs in several venues: website, mailing, municipal newsletters, municipal forums, and individual personal contact</p>	<p>1. Watershed Association</p> <p>1. Conservation District</p> <p>1. County Planning Commission</p> <p>1. Municipal Governments</p> <p>1. Local Social Organizations</p> <p>2. Watershed Association</p> <p>2. School District</p> <p>3. Watershed Association</p> <p>3. Conservation District</p> <p>3. County Planning Commission</p> <p>3. Municipal Governments</p> <p>3. Local Social Organizations</p> <p>4. Watershed Association</p> <p>4. Conservation District</p> <p>4. County Planning Commission</p> <p>4. Municipal Governments</p> <p>4. Local Social Organizations</p>	<p>1. H</p> <p>2. H</p> <p>3. M</p> <p>4. M</p>

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	<p>5. Identify interest in participating in the Builders for the Bay program</p> <p>6. Complete a signage and wayfinding project to increase knowledge of the location of the Conodoguinet Creek's and its access points</p> <p>7. Organize outings and gatherings on the Creek and its watershed to help increase the public's knowledge, appreciation and adoption of the Creek</p>	<p>5. Alliance for the Chesapeake Bay</p> <p>5. Watershed Association</p> <p>5. Municipal Governments</p> <p>6. Watershed Association</p> <p>6. Susquehanna River Basin Commission</p> <p>6. Conservation District</p> <p>7. Watershed Association</p> <p>7. Municipal Governments</p> <p>7. Conservation District</p> <p>7. County Planning Commission</p> <p>7. Local Social Organizations</p> <p>7. Local Businesses and Industries</p>	<p>5. L</p> <p>6. H</p> <p>7. H</p>
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