

---

## Chapter 6

### Natural Resource Protection

## Introduction

Pennsylvania is blessed with diverse and abundant natural resources. Protection of these resources for future generations has always been important to our citizens and is incorporated into our State constitution.

*"The people have a right to clean air, pure water, and to the preservation of the natural, scenic, historic, and aesthetic values of the environment. Pennsylvania's resources are the common property of all the people, including generations yet to come. As trustee of these resources, the Commonwealth shall conserve and maintain them for the benefit of all the people."*

- Section 27, Article 1 of the  
Pennsylvania State Constitution

Development of an open space preservation plan involves a comprehensive exploration of natural resources to inventory physical features and land characteristics that contribute to the unique natural setting of a place or area. The inventory of natural resources is followed by an assessment of vulnerability and need for protection of the resources through preservation strategies.

The natural resources of Cumberland County were explored via Geographic Information Systems (GIS) mapping. Resources were analyzed from three perspectives: 1) to identify significant natural resources of the County that should be protected and preserved; 2) to identify areas of vulnerable resources that are threatened or may be threatened in the future; and 3) to identify patterns of resources that contribute to an open space preservation network.

The inventory of natural resources is presented graphically on numerous maps located at the end of this chapter. The value of the mapping is in the analysis, interpretation, and conclusions that guide open space preservation strategies. The maps provide generalized information for planning purposes.

## Natural Resources of Cumberland County

Cumberland County is fortunate to encompass significant natural features that contribute to its scenic beauty and the quality of life it offers residents. The wooded ridges of Blue Mountain and South Mountain, the stream corridors of the Yellow Breeches Creek and Conodoguinet Creek, and the Susquehanna River along the eastern boundary are natural resources that define Cumberland County. The valley lands between the ridges with its rich agricultural soils, wetlands, and riparian areas add to the diversity of the County's natural resources. The *Land Use/Land Cover Map (Map 6-1)* illustrates the natural resources and land cover categories prominent throughout the County.

## Geology

The Cumberland County Comprehensive Plan (2003) provides a detailed description of the geology of Cumberland County. The geology of the County was affected by numerous geologic events and contains five different rock formations as illustrated on the *Geology Map (Map 6-2)*. Limestone areas are found throughout the valley and toe of the South Mountain area. Shale areas are found along the Blue Mountain ridge's south slopes.

Limestone's geologic characteristics make it extremely vulnerable to groundwater contamination. The extensive fractures and porous nature of limestone presents concerns for sinkholes and foundation stability as well as infiltration of pollutants in developed areas. Limestone geology dominates the Cumberland County valley.

## Woodlands

The wooded ridges of Cumberland County are a scenic and natural resource valued by citizens and visitors to the County.

Approximately 30 percent ( $107,500 \pm$  acres)<sup>1</sup> of the County is covered by woodlands and the wooded areas are primarily located along the County's northern and southern ridge lines. The Blue Mountain ridge aligns with the northern boundary of the County and the South Mountain ridge aligns with a portion of the southern boundary of the County. The central valley of the County and the lower portion of the northern ridge have small wood lots, primarily associated with areas of steep slopes and streams. The *Woodland Map (Map 6-3)* illustrates the wooded areas of the County.

Much of South Mountain is protected through State ownership of Kings Gap Environmental Center, Pine Grove Furnace State Park and Michaux State Forest. Blue Mountain, within Cumberland County, is more vulnerable than South Mountain as much of the Blue Mountain ridge top is in private ownership. The Tuscarora State Forest and State Game Lands No. 170 along Blue Mountain are primarily within Perry County. Only Colonel Denning State Park and State Game Land No. 230 afford public protection of the Blue Mountain ridge area in Cumberland County.

Protecting the wooded areas of Cumberland County is important from a scenic, recreation, and natural resource protection perspective. The wooded ridge lines frame the valley floor and provide a scenic backdrop to the valley landscape. The wooded areas are enjoyed for hiking, mountain biking, camping, hunting, nature study, and other nature- based recreation activities. The woods provide habitat for shelter, nesting, and food for wildlife; and protect groundwater by protecting headwaters and filtering stormwater runoff; cool mountain streams; and stabilize slopes to minimize erosion.

---

<sup>1</sup> GIS Calculation, 2004.

## Topography

The ridges of Blue Mountain and South Mountain are the primary topographic elements of the County. These features frame the gently sloping valley floor with its valuable agricultural soils. The *Steep Slope Map* (Map 6-4) illustrates the areas of slope from 15 to 25 percent (approximately 5 percent of the county or 17,900 ± acres) and slopes exceeding 25 percent (approximately 7 percent or 23,650± acres)<sup>2</sup>.

The publicly owned land of South Mountain protects a majority of the steep slopes in the southern portion of the County, but there are several significant areas that are not protected. These unprotected areas include the southern portion of Penn Township, a portion of Dickinson Township west of Mt. Holly Springs, and the southeast portion of South Middleton Township and the southwestern portion of Monroe Township. The steep slopes to the north are much more vulnerable except where they coincide with Colonel Denning State Park and State Game Lands No. 230. Small areas of steep slopes are also found along the Conodoguinet and Yellow Breeches Creeks.

Steep sloping areas are prone to erosion and are difficult to build upon. Cumberland County is fortunate that the majority of slopes falling within these categories are currently wooded. The wooded cover protects steep areas by stabilizing the slopes with root systems, and slowing runoff to maximize groundwater infiltration. It is important that municipal ordinances contain provisions to protect steep slopes from development and clear cut removal of wooded cover that would accelerate erosion of sloped areas.

## Natural Areas Inventory

A Natural Areas Inventory (NAI) was completed for Cumberland, Dauphin, and Perry counties by the Pennsylvania Science Office of The Nature Conservancy in 2000 and updated for Cumberland County in 2003. The NAI documents the known outstanding natural features of flora, fauna, and geology in the County. The inventory provides maps of natural communities and locations of animals and plant species of special concern for preservation of biological diversity in Cumberland County. The *NAI Sites Map* (Map 6-5) generally locates the NAI sites and highlights the first and second priority sites.

Eight priority NAI sites are documented in Cumberland County. These sites are associated with the lower portion of the Conodoguinet Creek and the wooded landscape and water resources of the South Mountain area. Of the eight sites, four are permanently protected via publicly owned lands (Big Flat Barrens, Iron Run, Sage Run/Mountain Creek Seeps, and Mt. Holly Marsh). Thomson Hollow Pond is afforded some protection through the Michaux State Forest. The remaining three sites are not protected. The Burd Run Caves site is extremely vulnerable due to its location in the targeted Growth Area, Route 81 traversing the site, and the

---

<sup>2</sup> GIS Calculation, 2004.

close proximity of a Route 81 exit. The Conodoguinet Creek site is in a highly developed portion of the County and on-going man-made activities have the potential to degrade the resource. The Hunters Run Site is not in the path of development but not permanently protected.

In addition to the eight priority sites, the NAI documents the importance of the Susquehanna River and its role as a larger scale natural system. "The Susquehanna River and its adjacent forested watersheds comprise one of the major corridors for the movement of biota in central Pennsylvania. This includes the habitat for resident species, habitat required for migrating birds on a biannual basis, habitat for resident and migratory aquatic animals, habitat needed for the long term survival of plant species, and more."<sup>3</sup>

Sustaining and protecting these priority sites, the Susquehanna River, and other sensitive natural resources is critical to maintaining biodiversity. Threats such as habitat loss and fragmentation; proliferation of invasive species; degradation of ecosystems; pollution; and changing land use patterns are impacting these priority natural sites. These sites have already been identified as vulnerable in Cumberland County and their protection should be furthered through open space preservation strategies.

### Rivers and Streams

The water resources of Cumberland County are illustrated on the *Water Resources Map (Map 6-6)*. The Susquehanna River forms the eastern boundary of Cumberland County. The Susquehanna River is the nation's sixteenth largest river and is the largest river lying entirely in the United States that flows into the Atlantic Ocean. The Susquehanna and its hundreds of tributaries drain 27,510 square miles, an area nearly the size of South Carolina, spread over parts of the states of New York, Pennsylvania, and Maryland. The river meanders 444 miles from its origin at Otsego Lake near Cooperstown, N.Y., until it empties into the Chesapeake Bay at Havre de Grace, Md. The Susquehanna contributes one-half of the freshwater flow to the Bay.

In Cumberland County, the river's edge and areas in close proximity to the Susquehanna River have been developed over time with industry, transportation routes, residential development, and other uses. The open space along the river corridor is fragmented and primarily in private ownership. Protection of the river as a riparian corridor is important. Recently, there has been a resurgence of interest in the Susquehanna River with the Susquehanna Greenway Partnership and other local initiatives to reconnect to the river.

The County's two main stream corridors, the Yellow Breeches Creek and the Conodoguinet Creek, traverse the valley from west to east as tributaries to the Susquehanna River. Significant tributaries to these streams are noted in Table 6- 1.

#### Cumberland County Watershed Associations

Big Spring Watershed Association  
[www.bigspring-pa.org/](http://www.bigspring-pa.org/)

Conodoguinet Creek Watershed Association  
<http://conocreek.org/>

Letort Regional Authority  
[www.letort.org/](http://www.letort.org/)

Yellow Breeches Watershed Association  
<http://www.ybwa.org/>

<sup>3</sup> Natural Areas Inventory – Cumberland, Dauphin & Perry Counties (Tri-County Regional Planning Commission, 2000), p.15.

Table 6-1	
Significant Streams of Cumberland County	
Main Stream	Tributaries
Yellow Breeches Creek	Cold Spring Run
	Mountain Creek
	Trout Run
	Cedar Run
Conodoguinet Creek	Trout Run
	Muddy Run
	Middle Spring Creek
	Paxton Run
	Green Spring
	Doubling Gap Creek
	Big Spring Creek
	Mt. Rock Spring Creek
	Opossum Creek
	Alexander Spring Creek
	Wertz Run
	Spring Run
	LeTort Spring Run
	Simmons Creek
	Hogestown Run
	Trindle Spring Run
	Sears Run

The Yellow Breeches Creek encompasses a 219 square mile watershed and includes Adams, Cumberland and York counties with 21 municipalities and approximately 368 stream miles. The creek is classified as High Quality Cold Water Fisheries between the source and Locust Point Road (SR 1007, near Williams Grove); between Locust Point Road and the mouth it is classified as a Cold Water Fisheries stream. Additionally, the Yellow Breeches Creek is classified as a Pennsylvania Scenic River. The Yellow Breeches Creek is also a renowned trout-fishing stream that draws anglers from well beyond the area to fish in its limestone cooled waters.

In 2005, the Yellow Breeches Watershed Association completed a River Conservation Plan and Watershed Assessment for the Yellow Breeches. The project scope included creating an inventory of watershed resources, identifying and ranking watershed problems, and developing strategies to solve these problems.

The Conodoguinet Creek originates in Horse Valley, Franklin County, next to the Kittatinny Mountain at an elevation of 1680 feet. From there, the Conodoguinet flows through the fertile Cumberland Valley, and joins the Susquehanna River near Harrisburg. The Conodoguinet Creek is classified as a Warm Water Fisheries stream within Cumberland County and is enjoyed for canoeing and recreational fishing.

The Conodoguinet Creek is approximately 90 miles in length and drains 540 square miles of diverse lands. Forested areas cover the upland basin, giving way to intense agriculture throughout the valley. Much of the Conodoguinet Creek watershed still has a strong agricultural flavor, including numerous cozy villages and small towns. While farming remains a prominent land use in the western part of the valley, dramatic growth in the Carlisle to Camp

Hill area has converted much agricultural land to residential and commercial uses. The Conodoguinet meanders toward the suburban west shore of Harrisburg through a series of elaborate bends and loops. "Conodoguinet" comes from an Indian word meaning "a long way with many bends."

The Conodoguinet Creek Watershed Association completed a River Conservation Plan for the middle section of the creek in 2003. Cumberland County and its partners completed a water trail guide for the waterway in 2004.

The LeTort Spring Run is a tributary to the Conodoguinet located in South Middleton, Carlisle, North Middleton, and Middlesex townships. It is renowned as a trout stream with native brown trout. Specific areas of the stream are designated as "No Harvest Fly-Fishing Only" locations. The LeTort is also designated as a Pennsylvania Scenic River. The scenic corridor stretches from Route 34 to its confluence with the Conodoguinet Creek. The LeTort Regional Authority was formed to address flooding concerns and promote conservation of the stream corridor.

The Big Spring Creek is another tributary of the Conodoguinet Creek. The Big Spring Watershed encompasses a 12.9 square mile area and the creek is approximately 5.1 miles long. Big Spring Creek is the 5th largest spring in Pennsylvania. It is one of the world's most productive limestone spring creeks and at one time was considered the best brook trout stream in the United States. The Big Spring Watershed Association (BSWA) was organized in mid-2001 to coordinate efforts to improve and protect the health of the Big Spring Watershed. They hope to restore the stream and reestablish a wild, natural reproducing brook trout population in its waters. The BSWA is also preparing a River Conservation Plan and other special watershed studies.

Cumberland County's stream and river corridors include riparian buffers that should be preserved and protected due to the benefits they provide. Riparian buffers:

- Stabilize Stream Banks – Deep-rooted vegetation binds the soil along stream banks, stabilizing the banks and preventing erosion during periods of high runoff.
- Improve Water Quality – Vegetation along streams traps sediment, nutrients, and pollutants before they enter the stream or groundwater.
- Enhance Wildlife Habitats – Trees, shrubs, and grasses along streams provide habitat, shelter, and travel corridors for many wildlife species.
- Reduce Flooding and Sedimentation – Vegetation retains stormwater runoff longer, improves infiltration, and filters sediment from flowing downstream during floods.
- Keep Streams Cooler and Healthier – Shade from riparian buffers cools the stream waters, increasing the food and oxygen for aquatic life.

- Enhance Scenery – Vegetation along streams adds beauty and diversity to the landscape.

Appendix C provides additional discussion and recommendations regarding riparian buffers.

Protection of the river and stream corridors of Cumberland County is important for sustainable growth and a healthy environment. The *Groundwater Vulnerability and Impaired Streams Map (Map 6-7)* illustrates relative potential risk for groundwater vulnerability based on a Penn State University model that considers geology, soils, and land use of an area. The map also highlights impaired streams based on an assessment used by the Pennsylvania Department of Environmental Protection. Impaired streams should be targeted for mitigation including nutrient reduction measures and use of Best Management Practices (BMPs).

It is important to protect streams, springs, and groundwater from pollutants to sustain clean safe sources of drinking water. Many County residents depend on groundwater for their household water needs. It is often noted that “we all live downstream” and that safe drinking water is essential to the health of everyone and the economic health of communities. However, our water resources are vulnerable to contamination from many potential threats. Silt from soil erosion; contaminants from landfills, fertilized farm fields, and livestock waste lagoons; spills and leaks from gas stations and underground storage tanks; failed on-lot disposal systems; surface runoff from roadways and parking lots are just a few of the threats to water resources and safe drinking water.

New residential areas can not be developed without sources of clean drinking water. Farmers require clean water for livestock and to water crops. Many industries need abundant clean water for their operations. Protection of Cumberland County’s groundwater; streams, river, and lakes; wetlands, and natural springs is critical to ensure the continued prosperity of our region.

### Floodplains

Floodplains are lands contiguous to stream corridors that are subject to flooding. The 100-year floodplain is the area that is most frequently mapped and referenced in planning. A 100-year flood is a flood having a one percent chance of being equaled or exceeded in magnitude in any given year. The 100 year floodplain is the area adjoining a river or stream covered by water in the event of a 100 year flood. The 100-year floodplain has been adopted by the Federal Insurance Administration as the base flood for purposes of floodplain management measures. Cumberland County has approximately 18,780 acres of 100-year floodplain, equating to approximately 5.3 percent of the County land area<sup>4</sup>. The *Wetlands/Floodplain Map (Map 6-8)* illustrates the 100-year floodplain.

---

<sup>4</sup> GIS Calculation, 2004.

Floodplain areas should be protected to retain the many ecological benefits they provide. Floodplains carry flood waters and should not be developed or built upon with structures that could diminish their carrying capacity. Additionally, floodplains provide areas for groundwater infiltration and riparian buffer vegetation which stabilize stream banks and filters sediment.

Many municipal ordinances contain provisions that regulate use of floodplain areas and protect them as open space to retain their important function in the landscape.

### **Wetlands**

Wetlands are areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands are identified by unique soils (hydric soils), by plants adapted to life in wet environments (hydrophytic vegetation) and by the presence of water (hydrology) during the growing season. Cumberland County has approximately 5,390 acres of National Wetland Inventory wetlands, encompassing 1.5 percent of the County<sup>5</sup>. Cumberland County's wetlands are primarily associated with stream corridor and floodplain areas. Wetlands are protected by State and Federal regulations.

Wetlands should be protected for their numerous benefits including groundwater recharge, wildlife habitat, flood and sediment control, and stormwater management. They are essential to maintaining a sound ecosystem. Wetlands identified through the National Wetlands Inventory mapping are shown on the *Wetlands/Floodplains Map (Map 6-8)*. The NWI wetlands mapping provides generalized locations for wetlands and should not be used for regulatory or jurisdictional wetland identification.

### **Priority Conservation Areas**

An analysis of Cumberland County's natural resources was completed to help prioritize preservation of those resources. Using Geographic Information System (GIS), the landscape was ranked by placing a weighted factor on various data layers such as floodplains and steep slopes. The following layers were assigned a weighted factor of two (2): 100 year floodplain, woodlands, and steep slopes. Five other layers were assigned a weighted factor of one (1): NAI sites, moderately steep slopes, groundwater vulnerability (138+), regional greenway corridors, and wetlands. This analysis was run to determine the most critical areas based on overlapping sensitive features. The *Conservation Areas Map (Map 6-9)* illustrates areas with medium, high and very high conservation value.

---

<sup>5</sup> GIS Calculation, 2004.

The Blue Mountain ridge and the stream corridors with their associated headwater areas are highlighted on the Conservation Areas Map as critical areas for conservation. Additionally, infill and contiguous areas to South Mountain's preserved lands are highlighted as critical. The streams and water resources include important riparian areas, wetlands, and floodplain that require protection. The Blue Mountain ridge is a linear feature that provides wildlife habitat as a connected green corridor along the northern boundary of the County. The steep slopes of the County's ridgelines and their wooded cover should be protected to sustain their function in the landscape.

### **Resource Protection and the Future of Cumberland County**

Preservation of natural resources is critical to maintaining the quality of life enjoyed by Cumberland County residents. *The First Pennsylvania Environmental Readiness for the 21st Century Survey Report*, Pennsylvanians (90 percent) clearly understand the link between environmental health and human health and 64 percent believe that Pennsylvania's environmental and economic development can go hand-in-hand.<sup>6</sup> Clean water, productive soils, sustainable natural habitats are all important for Cumberland County's future.

If our waters are degraded we can not readily provide quality drinking water and must invest in expensive treatment to use this natural resource. If we build upon our best soils we will require more fertilizers and additives to produce our foods and feed our livestock. This will require a greater investment of money and time. If we haphazardly develop our land without concern for protection of sensitive natural areas we will not realize the economic benefit from tourism and consumptive and non-consumptive wildlife activities. In 2001, state residents and nonresidents spent \$3 billion on wildlife recreation in Pennsylvania.<sup>7</sup>

Sustaining our natural environment is an ecological necessity for the future stability of the environment and man. Ecosystems, sustain vital ecological functions such as photosynthesis, decomposition, water purification, climate regulation, soil formation, and pest control. All of these processes contribute to the stability of the earth's environment, which supplies us with the air we breathe, the water we drink, and the food we eat. All are connected by interdependent ecological relationships.<sup>8</sup>

---

<sup>6</sup> The First Pennsylvania Environmental Readiness for the 21<sup>st</sup> Century Survey Report (Pennsylvania Center for Environmental Education, 1998), p. 26.

<sup>7</sup> 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, Pennsylvania (U.S. Department of the Interior), p. 6.

<sup>8</sup> A Heritage for the 21<sup>st</sup> Century: Conserving Pennsylvania's Native Biological Diversity (Pennsylvania Fish & Boat Commission), p. 7.

## Natural Resource Protection (NRP) Strategies

To achieve Cumberland County's natural resource protection goals, a variety of types of strategies are needed. *Land Partnerships* includes strategies for acquisition and development, planning, promotion and education; together they offer a multi-faceted approach to natural resource protection:

### Acquisition & Development

NRP1. Cumberland County should provide funding and technical assistance to municipalities and non-profits to acquire important natural areas through easements, fee simple acquisition and use of an official map. Priority should be given to areas identified as having high conservation value.

### Planning

NRP2. Cumberland County should provide funding and technical assistance to municipalities to update land use ordinances to include natural resource protection provisions such as:

- Conservation subdivision and zoning (Natural Lands Trust's *Growing Greener: Conservation by Design*).
- Steep slope management
- Floodplain management
- Riparian Buffer Protection
- Wetland Protection
- Woodland Management, Tree Protection
- Source Water and Wellhead Protection
- Stormwater Best Management Practices

NRP3. Cumberland County should develop or fund the development of model natural resource protection ordinances for distribution at the municipal level.

### Promotion

NRP4. Cumberland County should coordinate and partner with the Natural Lands Trust to promote *Growing Greener: Conservation by Design*.

NRP5. Cumberland County should support and partner with local watershed organizations including the Big Spring Watershed Association, Conodoguinet Creek Watershed Association, Letort Regional Authority, and Yellow Breeches Watershed Association, to implement local river conservation plans.

NRP6. Cumberland County should promote the Natural Areas Inventory and encourage its use in municipal land use planning and development.

---

NRP7. Cumberland County should support and partner with local stakeholders to protect natural resources; including, but not limited to the following organizations:

- Alliance for the Chesapeake Bay
- Audubon Pennsylvania
- Central Pennsylvania Conservancy
- Cumberland County Conservation District
- Pennsylvania Department of Conservation and Natural Resources
- Susquehanna Greenway Partnership
- The Highland Coalition
- The Nature Conservancy

### Education

NRP8. Cumberland County should raise public awareness about the importance of protecting Cumberland County's natural resources.

NRP9. Cumberland County should educate private landowners about voluntary land conservation options.

NRP10. Cumberland County should conduct educational workshops for municipal officials on natural resource protection regulations.

### Website Resources

Alliance for the Chesapeake Bay  
[www.acb-online.org/](http://www.acb-online.org/)

Audubon Pennsylvania  
<http://pa.audubon.org/kittatinny/>

Central Pennsylvania Conservancy  
<http://www.centralpaconservancy.org/>

Cumberland County Conservation District  
<http://www.cumberlandcd.com/>

Pennsylvania Department of Conservation and Natural Resources  
<http://www.dcnr.state.pa.us/>

Susquehanna Greenway Partnership  
[www.susquehannagreenway.org/](http://www.susquehannagreenway.org/)

The Highlands Coalition  
<http://www.highlandscoalition.org/>

The Nature Conservancy  
<http://nature.org/>