
SUSTAINABLE ENVIRONMENT

Environmental sustainability means using natural resources wisely to meet current needs without degrading the supply and quality of those resources for the future.



The goal of a sustainable environment supports Baltimore County's vision for community vibrancy and economic vitality. Environmental sustainability means using natural resources wisely to meet current needs without degrading the supply and quality of those resources for the future. Natural resources and air quality are essential to economic growth, environmental protection, energy conservation, and quality of life. Natural resources, especially forests and wetlands that comprise the green infrastructure, provide valuable ecosystem services including cleaning air and water. Sustainability also assures habitat protection for terrestrial and aquatic wildlife and genetic diversity.

Baltimore County’s environmental mission is to protect and perpetuate the natural resources of the County and to protect environmental health. Over the past 20 years, the County’s Department of Environmental Protection and Resource Management (DEPRM) has established and implemented programs to protect critical natural resources, restore ecosystem functions, and educate citizens about good stewardship. While the County’s environmental programs are nationally recognized, the pollution from sprawl development and unmanaged agricultural activities, as well as the continued loss of forests, requires significant changes to land use practices under new federal and State programs to restore the health of the Chesapeake Bay. *Master Plan 2020* builds upon past successes and recommends new policies to address emerging environmental challenges such as climate change.

Overall, both the biggest challenge and the most important reason for the County to serve as a catalyst for good resource management is the fact that 85% of the land area and resources in Baltimore County, depended upon and enjoyed by all, are privately owned. DEPRM uses an integrated watershed management framework to accomplish its mission, including land preservation, resource protection/regulation, restoration, facility maintenance, monitoring, planning and research, and citizen education and participation.

Nature-Friendly Community

“Baltimore County, Maryland, has one of the most ambitious and successful land management and environmental protection programs in the country. An impressive combination of tools and strategies – land use regulations, land acquisition, and urban growth boundary, education, partnerships with private land trusts, and infill development initiatives – has been employed to preserve thousands of acres throughout the county and protect critical wildlife habitat....Baltimore County is in many ways a model for local governments everywhere when it comes to protecting nature and biodiversity.” (Source: Duerksen and Snyder, 2005. Nature-Friendly Communities: Habitat Protection and Land Use Planning. p.152).

Climate Change

Citizens in Baltimore County and elsewhere are debating the implications of a changing climate as it relates to human activities. Of particular interest is whether human-produced greenhouse gases are causing long-term global warming. Baltimore County, as part of the global community, should reduce and mitigate negative impacts of human activities on the environment.

County government operations, private businesses, and the daily routines of citizens have great potential to increase atmospheric pollution through release of harmful gases and thermal pollution. One concern about a changing climate is the relative increase in sea level. While the rate and extent of sea level rise are under continuing study, it is estimated that the mean high tide in the coastal areas of the County may increase from three to five feet in the next century. Overall, the retention and planting of forests and trees is considered the single most effective measure for mitigating the negative impact of climate change.

Citizens can make adaptations to actions that might contribute to climate change, and mitigate impacts that are unavoidable or more difficult to prevent. This represents also good stewardship of limited energy and financial resources. Human activities that potentially affect the degree of climate change are mostly attributed to the production, use, and conservation of energy. Most of current energy in Maryland derives from coal and other fossil fuels that increase harmful atmospheric gases. Walking or riding a bike instead of driving, turning off lights and other electrical appliances when not in use, changing light bulbs from fluorescents to LED’s, and similar actions are beneficial to the environmental health and natural resources. Energy conservation and other climate change adaptation and mitigation actions will lead to significant changes in current economic structure and community function. Over the long term, they will enhance sustainability.

Policy: Continue to adapt to, and mitigate impacts of climate change on the environment.

Actions:

(1) Implement the recommendations of the County's Sustainability Network for County operations, energy conservation, protection of natural resources, and communities in order to reduce emissions of greenhouse gases and energy consumption.

(2) Develop appropriate indicators for sustainability actions and commitments in order to summarize sustainability conditions and trends and to provide a basis for evaluation of progress.

Environmental Justice

The development of environmental justice in the United States dates to almost three decades ago when communities began to form organized protests against traditional planning efforts to site polluting factories and toxic waste dumps in less affluent and often minority neighborhoods. Local victories empowered local protesters to coalesce into a national movement. In 1994, President Clinton signed an Executive Order focusing the federal government effort on protecting or improving the quality of the environment and human health conditions for all communities.

The federal government definition of environmental justice is applicable to all levels of state and local government planning. Environmental justice calls for the fair treatment of all minority, indigenous, and low-income populations to ensure that no individual racial, ethnic, or socioeconomic group will bear an unequal burden due to the negative effects of pollution or other environmental hazards. Environmental justice also promotes equal access to public information and equal rights to participate in the development, implementation, and enforcement of environmental laws.

The Phase I Action Plan of the Baltimore Watershed Agreement between Baltimore County and Baltimore City specifically calls for consideration of environmental justice issues in the course of watershed management planning.

Policy: Incorporate environmental justice considerations when developing Small Watershed

Action Plans to address water quality protection and restoration.

Actions:

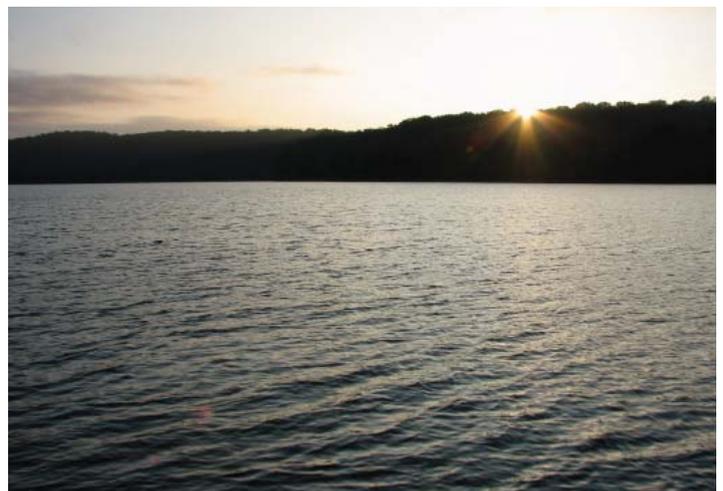
(1) Review environmental justice indicators developed nationwide and develop a set of indicators for the watershed management planning process.

(2) Include the environmental justice indicators in the Small Watershed Action Plans for prioritizing water quality improvement projects.

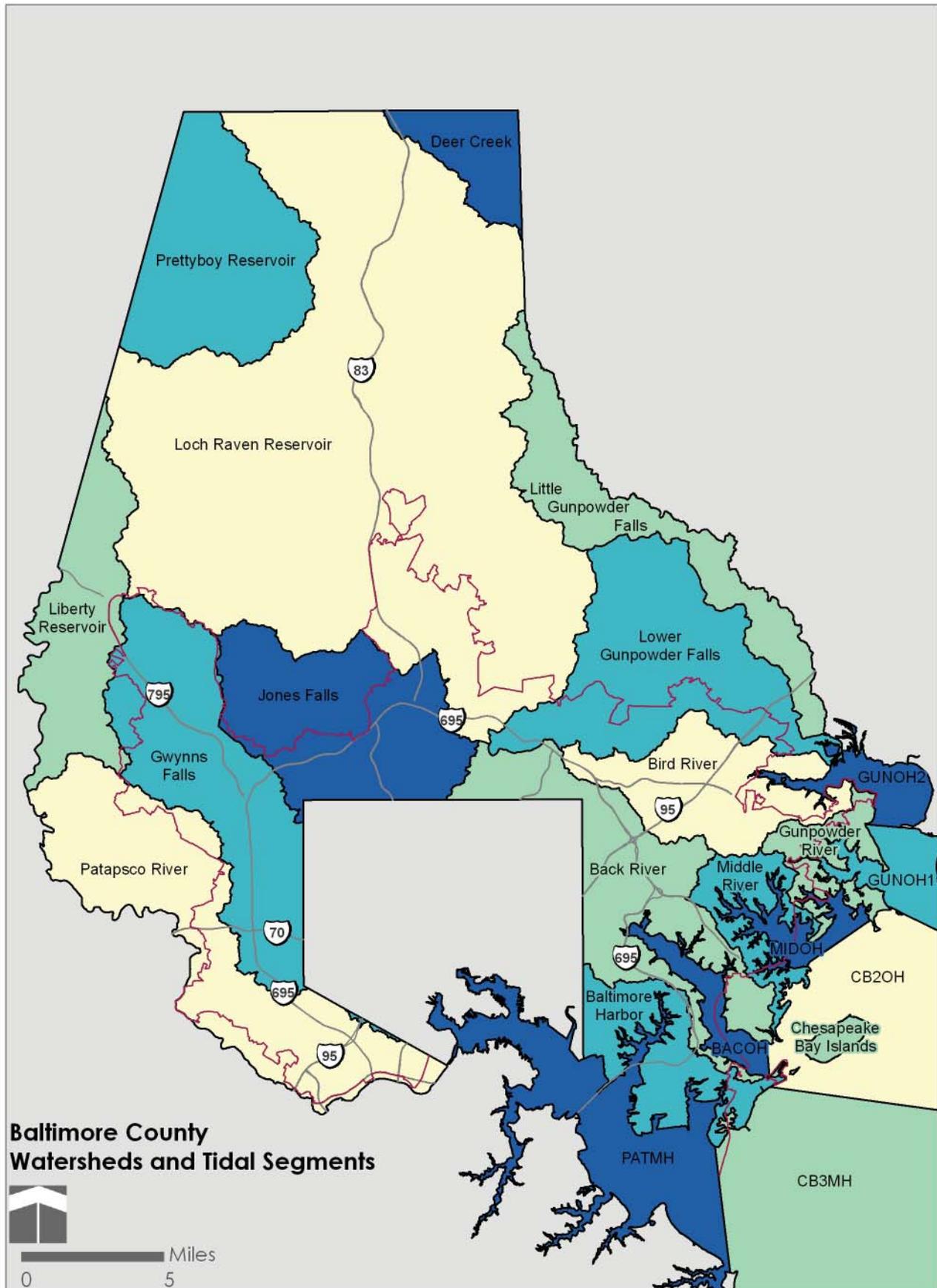
WATER RESOURCES

The water resources of Baltimore County include over 2,100 miles of streams, groundwater resources, three drinking water reservoirs, non-tidal and tidal wetlands, and tidal waters. All of these water resources are interconnected through the hydrologic cycle driven by precipitation in the form of rain and snow. These water resources are also interconnected with surrounding jurisdictions and through tidal exchange with the Chesapeake Bay.

Precipitation falling on the land drains to streams, either as surface flow or through groundwater flow. The land surface that drains to a particular stream is called a watershed or a basin. The Chesapeake Bay is a large basin with a total drainage area in excess of 64,000 square miles.



Map 36: Watersheds and Tidal Segments



Water Use Classification of County Waterways

In order to protect multiple water uses, the State of Maryland has designated four Use Classes and associated water quality standards. If the water is a source for a public drinking water supply, a "P" follows the Use Class.

The four Use Classes (and subcategories for Use II) are:

Use I

Water contact recreation and protection of non-tidal warm water aquatic life.

Use II

Support of estuarine and marine aquatic life and shell fish harvesting (not all subcategories apply to each tidal water segment); Shellfish harvesting; Seasonal migratory fish spawning and nursery (Chesapeake Bay only); Seasonal shallow-water submerged aquatic vegetation (Chesapeake Bay only); Open-water fish and shellfish (Chesapeake Bay only); Seasonal deep-water fish and shellfish (Chesapeake Bay only); Seasonal deep-channel refuge use (Chesapeake Bay only)

Use III

Non-tidal cold water – usually considered natural trout waters

Use IV

Recreational trout waters – waters that are stocked with trout



substance in any watershed or tidal segment, the State must determine how much of the substance must be reduced through modeling. This is referred to as a Total Maximum Daily Load (TMDL), or the maximum amount of a particular pollutant in a waterway that can be naturally assimilated while maintaining water quality standards

These waters support aquatic communities and provide for human uses such as agricultural irrigation and livestock watering, drinking water, industrial uses, fishing and boating, and receiving areas for treated wastewater. Having adequate clean water to support all of these uses is crucial to continued ecological and human health now and for the future, and for providing for the continued quality of life for citizens and the economic vitality of Baltimore County.

Waters in Baltimore County are of high quality in general. Some water resources are degraded by improper human activities. The waters that do not meet or exceed water quality standards are placed on an impaired waters list (Sec. 303(d) of the federal Clean Water Act) by the State of Maryland. These listings are based on 8-digit watersheds and tidal water segments, with each impairing substance listed separately. Regulations and policies require protection of high quality water resources and improvement of degraded water resources. High quality waters are protected through the permitting requirements associated with Tier II, defined as waters with a better than the average aquatic biological community. Tier II waters meet the anti-degradation requirements of the federal Clean Water Act. For each impairing

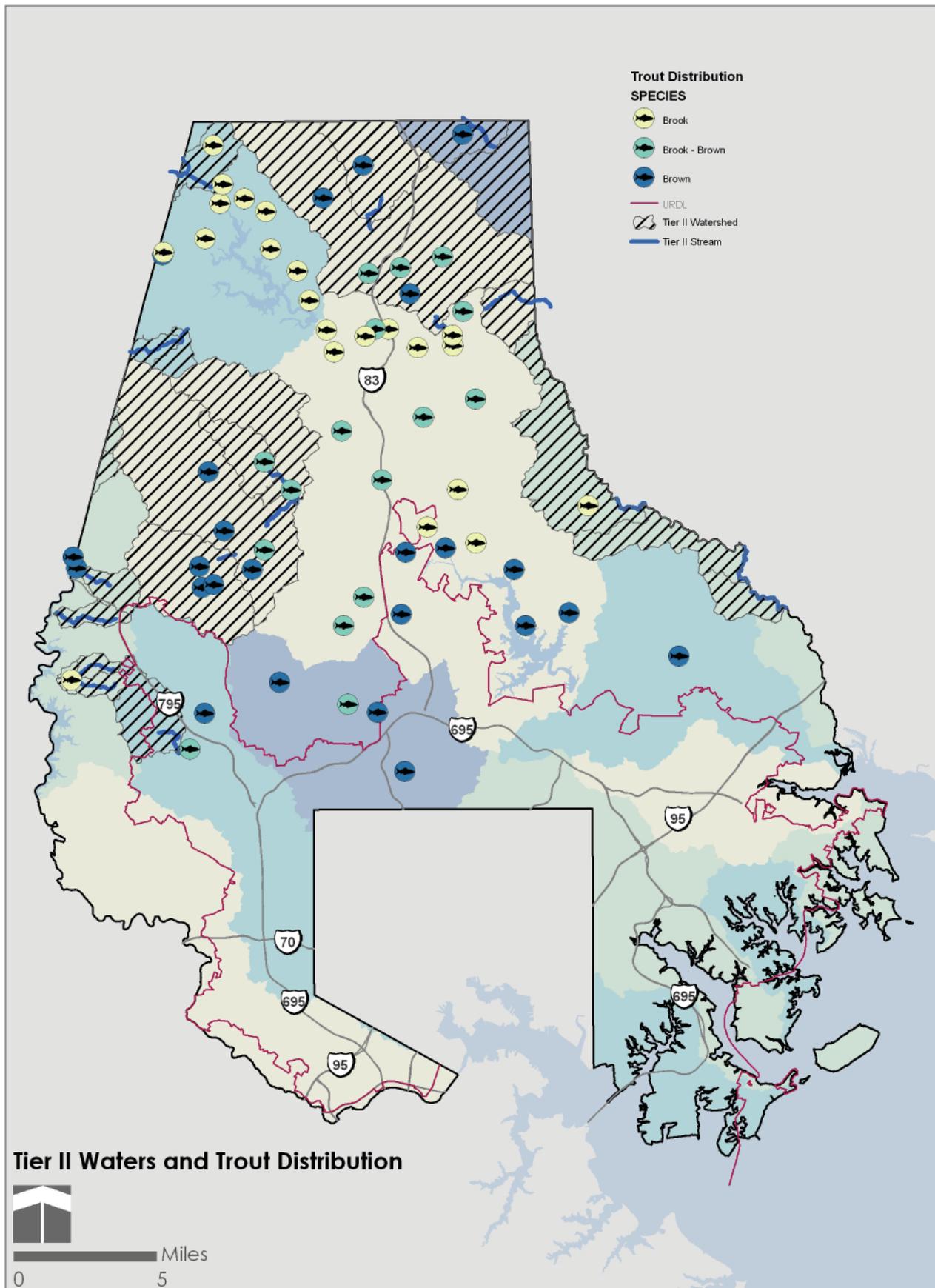
The principal regulatory requirement to address pollution impacts in urban areas is to implement the National Pollutant Discharge Elimination System - Municipal Separate Storm Sewer System (NPDES-MS4) permit. This permit requires the County to control the water quality that is discharged from its storm drain system, by implementing stormwater management, sediment control, education, monitoring, watershed management planning, and restoration programs. These programs are intended to control pollution from new development and restore

Tier II Waters and Trout

Tier II waters are identified and rated on the basis of aquatic community sampling by Maryland Department of Natural Resources. When both the fish and the bottom-dwelling invertebrate community have a rating of "good" the reach of stream represented by the sampling is identified as Tier II waters. Baltimore County has 33 miles of Tier II stream segments at 20 different sites, mainly in rural areas. The drainage area to these sites represents 23% of the County. These stream segments must be protected from degradation.

Trout are also indicative of higher quality water. Baltimore County's streams support a fairly good population of both brook and brown trout. Over 61 sites located on various streams have trout present. The trout are more wide spread than the Tier II waters, indicating that additional Baltimore County streams are still supporting aquatic natural resources.

Map 37: Tier II Waters and Trout Distribution



Total Maximum Daily Load (TMDL)

Baltimore County watersheds and tidal segments are impaired by a variety of substances, including nutrients, sediment, bacteria, trash, and various toxic substances, as well as biological impairments. The amount of each pollutant that needs to be reduced from each source in order to meet water quality standards is then determined. The model also indicates a cap for each pollutant based on the assimilative capacity of the water body. Any increase in a load from a new source must be offset to maintain the water quality standards. For each TMDL, the County is required to prepare an Implementation Plan with measurable implementation milestones and a projected timeline for meeting water quality standards.

The Chesapeake Bay is impaired by nitrogen, phosphorus, and sediment. The U.S. Environmental Protection Agency is developing TMDLs for nitrogen, phosphorus, and sediment to improve Bay water quality.

degradation caused by development that occurred prior to the current environmental protection requirements. Approximately 80% of the urban land was developed prior to environmental controls. Future permits will require preparing Implementation Plans for approved TMDLs and meeting water quality improvement and restoration milestones.

The Water Resources Element is an analysis of the adequacy of drinking water and wastewater treatment to support future population growth, and the ability to maintain and improve water quality within the County's receiving waters. The WRE analysis indicates that redevelopment will result in the greatest protection of high quality aquatic resources and reduction of pollution. The WRE is adopted as part of *Master Plan 2020*.

Watersheds

Baltimore County contains 14 major watersheds, which are identified on the basis of local stream systems and drinking water reservoirs. Seven of them are part of the Gunpowder River basin, six are in the Patapsco River basin, and one flows to the Susquehanna River basin. Watersheds are a useful framework for resource management. Individual resource elements including streams and forests are linked through ecosystem processes that operate to maintain the stability of the system.

Land use activities within watersheds affect the water quality of streams and downstream water bodies. Clearing forests increases stormwater runoff to streams, causing an increase in the amount of sediments, nutrients, and toxins and the erosion of stream channels. Changes in sediment and nutrient levels may degrade stream habitat quality. Land preservation programs that place environmentally sensitive land in permanent easements help protect watersheds and their interrelated systems.

The County's watershed program consists of characterizing and prioritizing watersheds, preparing management plans, including Small Watershed Action Plans (SWAPs), and evaluating resource systems and functions at varying scales. Assessments of pollutant loads, stream stability, and forest community structure provide the framework for the implementation of capital projects, facility maintenance, education programs, and cooperative citizen actions.

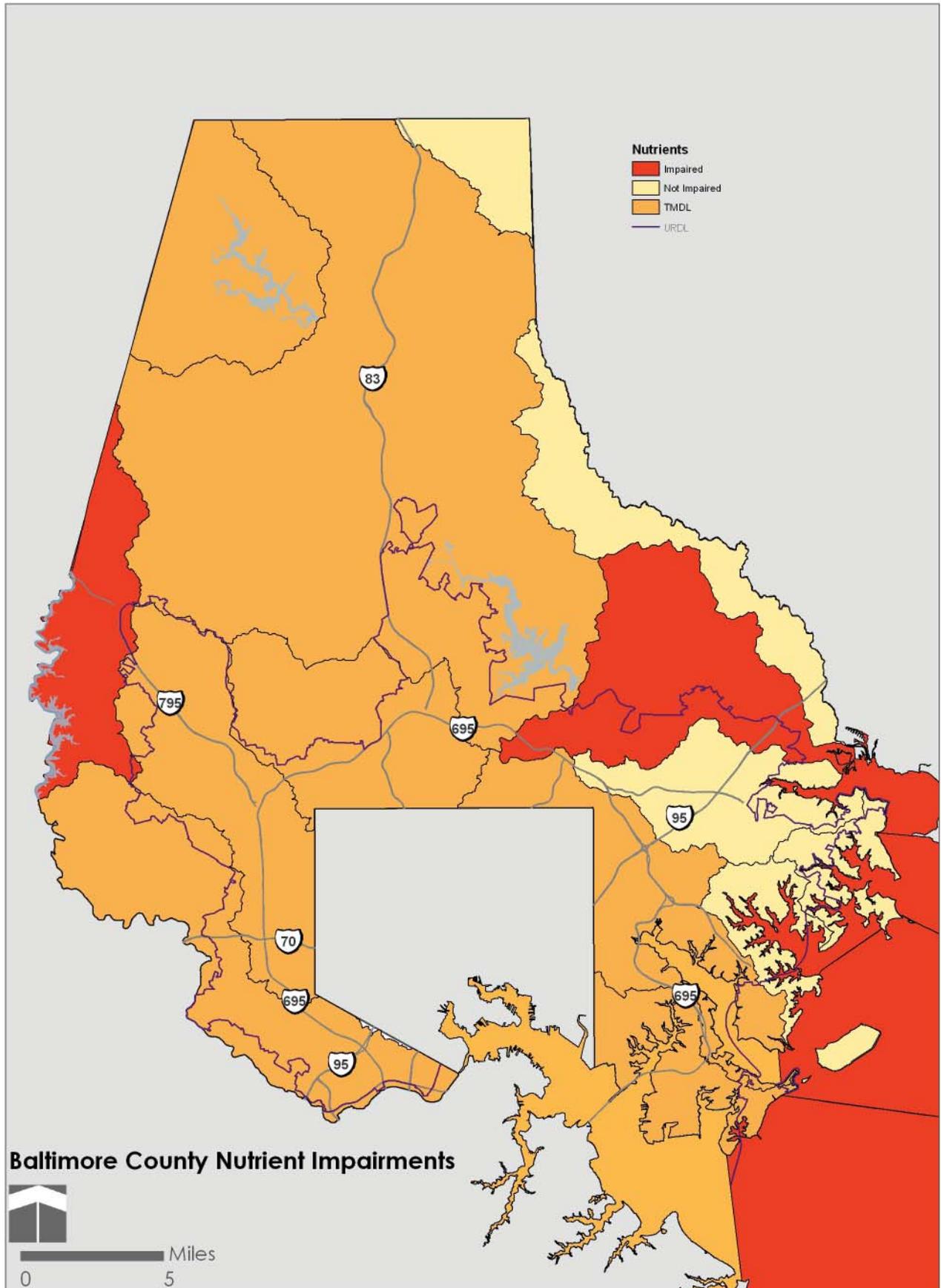
Policy: Promote redevelopment and revitalization inside the URDL to reduce pollutant loads and protect natural resources.

Actions:

- (1) Assure that the countywide redevelopment strategy accommodates population growth, provides maximum pollutant reduction, protects high quality waters, promotes economic vitality, and maintains a high quality of life for Baltimore County residents.



Map 38: Nutrient Impairments



(2) Include environmental policies and goals in community plans for the preservation and enhancement of functional open spaces such as greenways and wildlife habitat; the reduction of water, air, and toxic pollution and solid wastes; and the promotion of neighborhood environmental stewardship.

(3) Facilitate the redevelopment of underutilized industrial properties.

(4) Direct redevelopment efforts along the waterfront into historically disturbed, uncontrolled buffer areas in order to maximize water quality protection.

Policy: Assure protection of Tier II waters and those with known trout resources.

Actions:

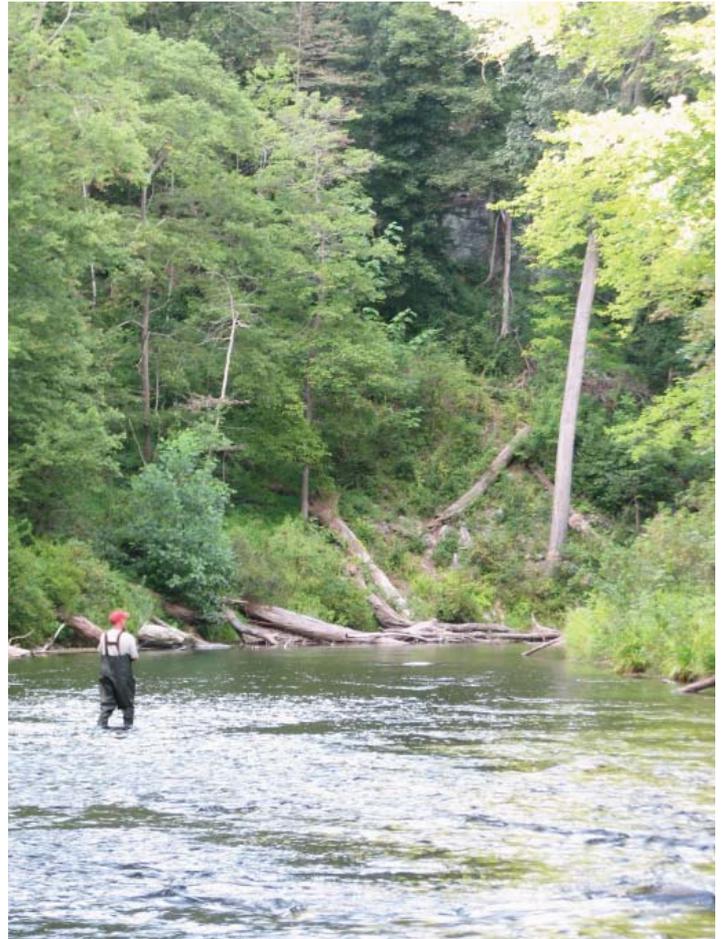
(1) Investigate the development of overlay zones for Tier II waters and those with known trout resources and evaluate the need for additional protection through development regulations.

(2) Examine the feasibility of an offset program to achieve a no net increase in pollutant loads from new development.

(3) Continue to protect water quality, streams, wetlands, floodplains, and forests from impacts of new development and redevelopment.

(4) Implement projects to restore wetlands, reestablish forests, plant stream and shoreline buffers, and stabilize stream channels in impacted watersheds.

(5) Continue to implement the 2006 Baltimore Watershed Agreement with the City of Baltimore for improved and coordinated efforts for public health, trash, stormwater management, community greening, and redevelopment.



Streams and Non-Tidal Wetlands

Baltimore County contains more than 2,100 miles of non-tidal streams and rivers, including some of the highest quality recreational fishery resources in the eastern United States and more than 1,000 miles of streams that drain to the three drinking water reservoirs. A stream system consists of a stream and its associated floodplain, wetlands, and springs. Wetland and riparian vegetation play an essential role in the natural functioning of a stream system, including maintaining base flow, regulating water temperature, controlling pollution, and providing habitat. Pollutants discharged from point and non-point sources degrade stream water quality. These sources include urban runoff (non-point sources, particularly from impervious surfaces), pollutants discharged directly to streams (point sources), and agricultural operations (non-point source). Urban non-point source types of pollution vary and include nutrients, sediments, metals, pesticides, oil and grease, salts, and other particulate and dissolved matter.

Point-source pollution, generated from wastewater treatment plants, industries, and other sources with a direct, piped discharge, is regulated by the State. Over the past several decades, channelization, encroachment of development on floodplains, draining and filling of wetlands, removal of riparian vegetation, and development or clearing of steep slopes and erodible soils has been detrimental to streams.

In 1987, DEPRM initiated a capital environmental restoration program to assess and identify water quality problems and implement design and construction of watershed restoration projects. The program is based on the County's 14 major watersheds, providing a comprehensive framework for protection and restoration of water resources. DEPRM has been recognized nationally for its stream restoration program and, with the completion of numerous projects, has made significant progress



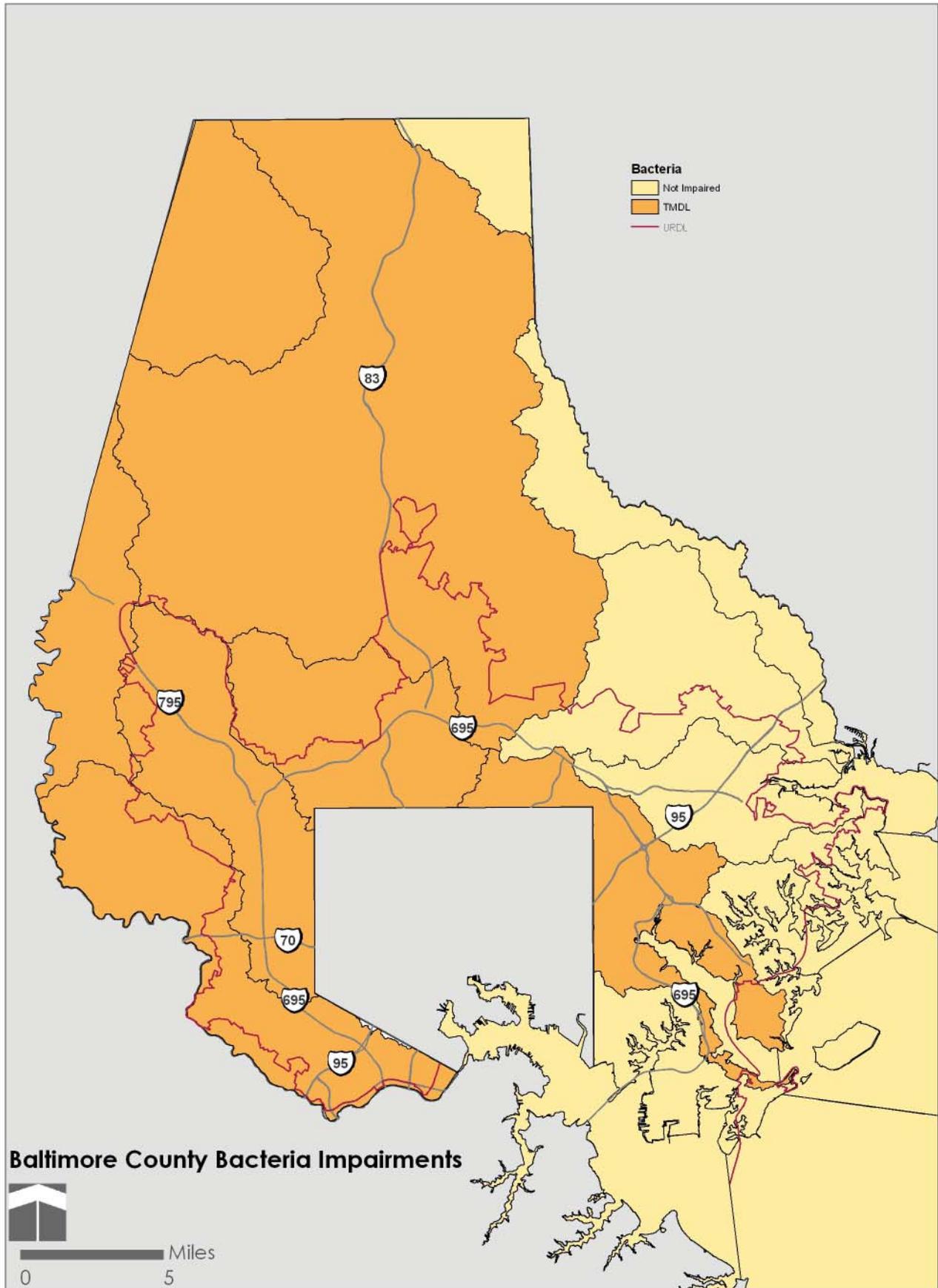
Stream Restoration

The U.S. EPA Mid-Atlantic Integrated Assessment program (MAIA) produced a document to share knowledge among state and local governments, regional offices, and non-governmental organizations. The document highlights DEPRM's stream restoration accomplishments. DEPRM's program incorporates project planning and design, communication and coordination with property owners, construction, and post-restoration follow-up. The program integrates state-of-the art techniques with an environmentally sensitive approach to stabilizing streams and reducing sediment loads, in turn enhancing stream morphology, ecological function, water quality, and aquatic habitat. Baltimore County responds to degraded urban streams with an adaptive natural channel design (NCD) approach that relies on the principles of fluvial geomorphology to evaluate stream flow, channel dimension, and bed and bank materials to optimize water and sediment movement and minimize erosive forces.

toward its objectives for watershed restoration. In the early 1990's Baltimore County developed regulations to protect water quality, streams, wetlands, floodplains, forests, and steep or highly erodible slopes from land development impacts. The County faces a challenge common to most areas experiencing urban growth: how to restore, protect, and enhance its waterways.

Physical changes to stream systems can be worse than pollutant runoff, point source discharges, or storm water management impacts. Since 1990, DEPRM has developed expertise in the restoration of destabilized stream channels. Reconstruction of channels applies the concepts of natural channel design (NCD) using natural materials (boulders and vegetation) in conjunction with the reshaping of the stream channels. When properly constructed, these restored streams are a cost-effective and attractive means to sustain physical stability, function, and habitat. Since the early 1990's, DEPRM has also maintained a physical, chemical, and biological stream monitoring program to determine ambient water quality and trends over time, assist in targeting restoration efforts, assess the effectiveness of restoration, and track progress in meeting TMDL pollutant load reduction requirements. The monitoring measures the abundance and diversity of aquatic life as indicators of stream quality and chemical constituents. Summary data from the biological monitoring indicate that there is fairly widespread impairment of aquatic organisms, even if only moderate, for most of the County's streams.

Map 39: Bacteria Impairments



Improvements to stream quality, in both water quality and habitat, will require a range of controls that best address specific types of pollution sources.

Policy: Continue to protect, enhance, and restore degraded waterways to meet water quality standards and permit requirements.

Actions:

- (1) Continue to enforce development regulations for the protection of water quality, streams, wetlands, and floodplains.
- (2) Continue to prepare and implement Small Watershed Action Plans (SWAPs) and participate in studies to identify needs and opportunities for stream restoration, wetland creation and restoration, and stormwater management.
- (3) Continue to design and construct stream restoration projects using an adaptive natural channel design (NCD) approach.
- (4) Incorporate stream protection policies in community plans.
- (5) Continue to implement biological, chemical, and geomorphological stream monitoring programs in order to measure the long-term trends in stream quality.
- (6) Identify opportunities for the creation of wetlands as mitigation for County capital projects and other land development impacts.
- (7) Continue environmental education programs for schools, businesses, and homeowners for the reduction of water pollution and toxic and solid wastes.
- (8) Continue to implement environmental inspection and maintenance programs such as storm drain inlet cleaning and maintenance of stormwater management facilities.
- (9) Continue to identify and convert appropriate publicly owned stormwater

management facilities to provide for increased water quality function.

(10) Continue to retrofit older communities to provide for stormwater treatment for improved water quality to the receiving waters.

(11) Continue to support watershed associations and citizens in stream clean-ups, stream and watershed surveys, and other restoration projects.

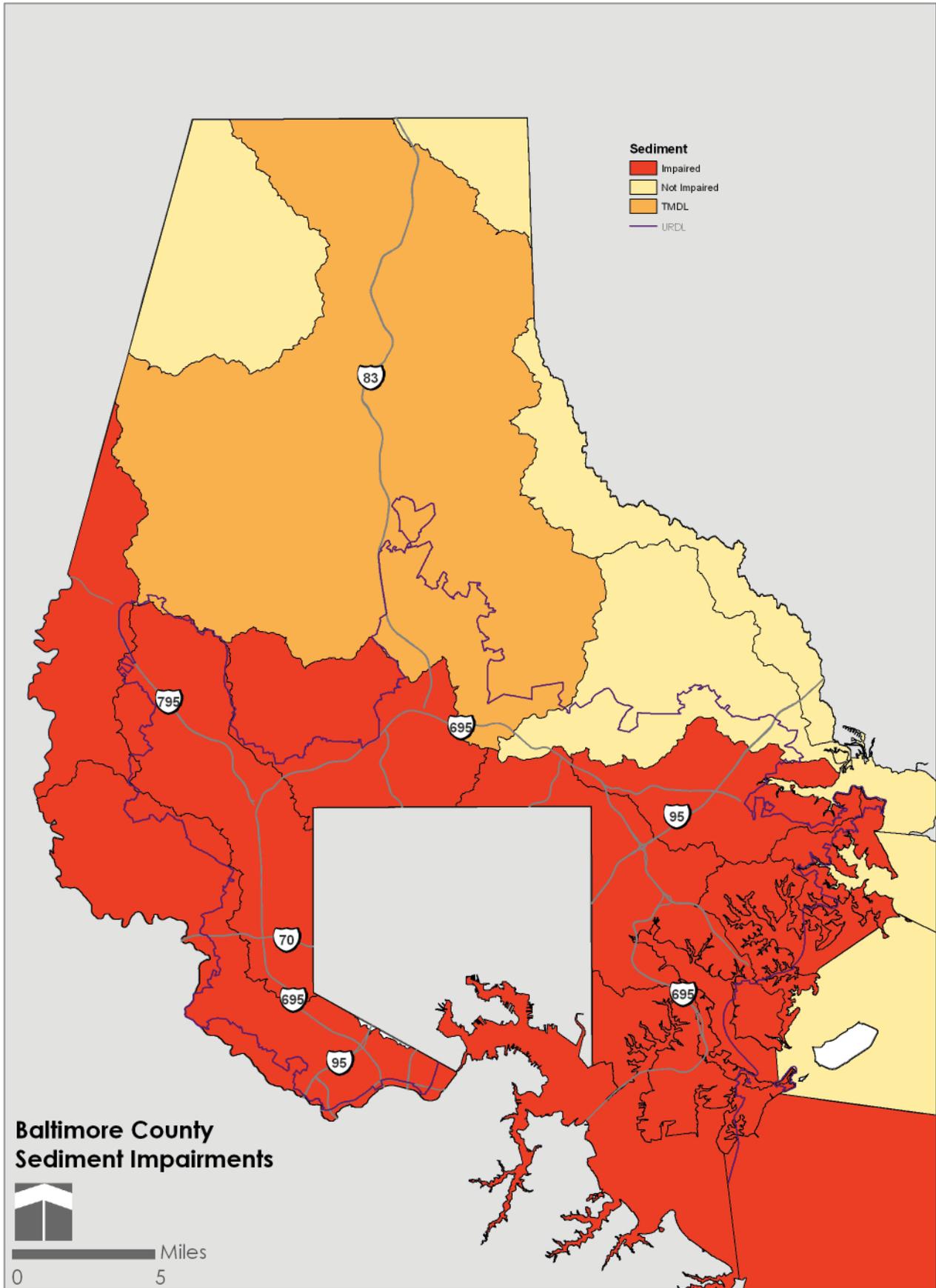
(12) Identify impediments to, and opportunities for tree plantings along streams on private properties, and work to plant more trees on private lands.

Stormwater Management and Sediment Control

The hydrologic cycle is a descriptive model for the movement of precipitation from the atmosphere to the earth's surface and then to receiving waters and back to the atmosphere. In natural areas, precipitation that reaches the ground infiltrates into the soil, replenishing groundwater aquifers and discharging to streams. In urban areas, precipitation that falls onto impervious surfaces runs off the surface much more rapidly. Unless properly controlled, stormwater runoff can result in stream channel erosion and the degradation of in-stream habitat and the aquatic biological community. Stormwater runoff also results in an increase of pollutants washed downstream. During the land development process, the soil at construction sites is the most vulnerable to erosion in streams and other surface waters. Soil erosion from construction activity may exceed 100 to 400 times that obtained from an adjacent undeveloped land or woodland in an equivalent period of time.

About 80% of Baltimore County was developed prior to the advent of stormwater management regulations, which damaged many waterways. In 1968, Baltimore County enacted Maryland's first local sediment control ordinance. Since the mid 1970's, Baltimore County has been a statewide leader in recognizing the impact of stormwater runoff generated as a result of land development. Stormwater management requirements have evolved over time. Initial

Map 40: Sediment Impairments



stormwater management focused on volume and peak discharge control to reduce physical impacts on streams. Beginning in the late 1980's through the early 1990's, water quality treatment was added as a means to address the increased pollutant loads associated with urban development. As stream science and understanding of stream dynamics evolved, it was recognized that further peak discharge control was necessary to protect stream channels from erosion during storm flow.

In the early 2000's, control of small storms was required, along with methods to disperse the flow from a development site instead of concentrating the flow. The Maryland Stormwater Act of 2007 further refined stormwater management by requiring Environmental Site Design (ESD) where practicable. ESD attempts to reduce stormwater runoff from a site by reducing impervious cover, retaining natural vegetation, and dispersing the runoff throughout the site to allow greater infiltration of precipitation. As Baltimore County's older urban and suburban areas are redeveloped, state-of-the-art stormwater practices will be constructed and water quality will improve.

Policy: Protect and improve water quality through the application of stormwater control measures for new development and redevelopment projects.

Actions:

- (1) Continue to implement state-of-the-art stormwater management techniques, including ESD as feasible, for new and redevelopment



projects.

- (2) Provide flexibility for redevelopment to implement innovative solutions to stormwater management.
- (3) Ensure the sustainability of stormwater practices including long-term function and maintenance.

Policy: Inspect and enforce compliance with the Baltimore County Code, permits, plans and State specifications as related to erosion and sediment control and grading.

Actions:

- (1) Continue to inspect and enforce erosion and sediment control implementation on all active projects for compliance with approved plans.
- (2) Continue to investigate complaints pertaining to erosion, sediment control, grading, and surface drainage problems associated with new construction.
- (3) Continue to provide responsible personnel training and certification of individuals that oversee installation and maintenance of project controls.
- (4) Continue to work in cooperation with the Baltimore County Soil Conservation District to require minimum standards for Soil Conservation and Water Quality Management Plans for conservation easements.

Best Management Practices (BMPs) for Agriculture

Best Management Practices (BMPs) that prevent soil erosion and protect water quality provide long-term benefits for maintaining the productive quality of farmland. Farmers are assisted in their efforts to apply BMPs by the Baltimore County Soil Conservation District, University of Maryland Extension (UME), the Maryland Department of Agriculture, the U.S. Department of Agriculture's Natural Resources Conservation Service, and the U.S. Farm Services Agency. Farmers and landowners participate in

On-site Sewage Disposal Systems (OSDS)

The proper siting, design, and construction of OSDS is critical to protecting ground water supplies and public health.

Overall, there are relatively few problem areas for OSDS in Baltimore County. Should community health threats be documented in areas that are accessible to the Metropolitan District, extension of public water or sewerage is provided on a long-term financing basis. In areas that are not accessible to public water and sewer, problems with private water and sewage disposal are more difficult to correct. Some rural communities have limitations due to poor or marginal soil conditions, small property sizes, requirements for stormwater management, and zoning issues, which may impede corrections to failing OSDS.

Increasing concerns with water quality and nutrient loading along with advances in technology have resulted in a relatively large increase in usage of non-conventional OSDS since 2000.

*Continued operation and maintenance is considered critical to ensure that these systems operate effectively. As these types of systems continue to proliferate, inspection and enforcement will become more critical. An evaluation of OSDS problem areas and management solutions is presented in the 1999 study, *Water and Sewer Service in Rural Baltimore County Maryland*, available at: <http://www.baltimorecountymd.gov/Agencies/environment/groundwatermgt/educational.html>*

*Other than the Chesapeake Bay Critical Area, the use of nitrogen removal technology on OSDS in Baltimore County does not appear to be cost effective for reducing nitrogen loads to the Chesapeake Bay, especially in reservoir watersheds where nitrogen loads are reduced by 89% or better due to the treatment effects of the reservoirs themselves. A detailed discussion of nitrogen loading from OSDS is presented in the WRE, Chapter 4, *Wastewater Assessment for Private OSDS* (Appendix A).*

In 2008, DEPRM started to collect information about the locations of wells and OSDS in the County using Global Positioning System (GPS) units. From this data, a detailed GIS data layer is being created to enable rapid assessment of local and regional water quality and well yield issues. In the event of an emergency (i.e. chemical spill, flood, or other natural disaster), accurate assessment and timely response are both expected by the public and critical for the protection of public health.

stewardship programs that help protect local streams, drinking water reservoirs, and the Chesapeake Bay. However, in order to make greater progress in protecting and restoring water quality, landowners need to increase stewardship actions.

Policy: Work with landowners and service agencies to implement Best Management Practices for agriculture.

Actions:

- (1) Require landowners who participate in land preservation programs to implement soil conservation and water quality plans.
- (2) By 2011, investigate developing a BMP implementation monitoring system with the Baltimore County Soil Conservation District.
- (3) Continue to provide support to the farm agencies including UME.
- (4) Provide information on research for new technologies to assist landowners with the implementation of BMPs.
- (5) Investigate setting minimum water quality standards for plans written for farms in County land preservation programs, in conjunction with cost-share programs to offset the expenses incurred by landowners.
- (6) Investigate innovative strategies, approaches, and incentives to encourage landowners to protect resources and overcome disincentives.

Groundwater

In Baltimore County, favorable geological conditions and plentiful precipitation combine to provide a valuable supply of quality groundwater that is used for agricultural, residential, commercial, and industrial uses. Since the establishment of the URDL in 1967 and the adoption of the *1980 Guideplan* in 1972, deliberate zoning, regulation, and policy have been put into place to implement the vision of a compact urban

area served by public utilities and a rural area with low density development served by individual wells and on-site sewage disposal systems (OSDS). Given this vision, it is imperative that the County takes the necessary precautions to ensure that development in the rural areas has safe and sustainable ground water supplies.

About 10% of the County's population currently resides in the rural areas outside the URDL and relies on groundwater as the primary source of drinking water. Approximately 30,000 domestic wells are in use in the County, including 9 community well supplies and approximately 270 transient and non-transient non-community water supplies (businesses and institutions). Groundwater is also important to the agricultural community.

In general, there are no significant concerns with regard to the adequacy or quality of ground water supplies in Baltimore County. The current regulations and standards for drinking water wells and OSDS are considered effective in protecting public health while ensuring that there is adequate supply for current and future demands. The Water Resource Element (Appendix A) documents the adequacy and quality of the ground water supplies in the County. To better ensure sustainable ground water supplies, a well reserve area could be incorporated for lots served by individual domestic wells. The well reserve area would ensure that lots have a pre-approved area that meets setback requirements, should there be a need to drill a well in the future.

Contamination from petroleum products and solvents usually involves specific point sources such as underground storage tanks, OSDS, or dumpsites. Promulgation of federal and State regulations has resulted in storage tank upgrades, and more stringent monitoring and reporting requirements for all auto service stations. Educational outreach about potential sources of contamination and the importance of removing out-of-service underground fuel tanks should continue to be a focus of the County.

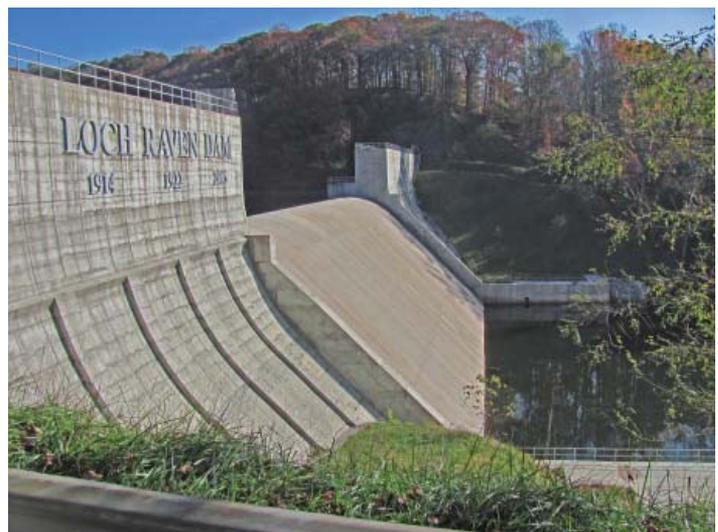
In 2005, naturally occurring radium was detected at levels of concern in certain aquifers (the Baltimore & Setters Gneiss Formations). Educational outreach

about radium and other potential radionuclides in local aquifers should continue to be a focus of Baltimore County. Groundwater quality is also affected by development-related contaminants such as chlorides from road de-icing compounds. Further analysis and evaluation should be performed to develop improved regulations and practices, along with education, training programs, and partnerships to ensure a better balance between public safety on roadways and water quality.

Policy: Continue to manage and protect ground water supplies, particularly in areas where citizens, businesses, industry and agriculture rely solely on wells.

Actions:

- (1) Review development proposals and permits to assure the proper siting, design, and construction of drinking water wells and OSDS in accordance with the *Code of Maryland Regulations* and *Code of Baltimore County Regulations*.
- (2) Continue to implement the 1993 *Ground Water Management and Protection Strategy*.
- (3) Continue to inspect all residential underground storage tank removals to ensure that any detected contamination is investigated and remediated, as necessary.
- (4) Continue to collect and maintain the



location and construction information for new and existing wells and OSDS.

(5) Continue to educate homeowners concerning the proper management and care of individual well and septic systems, potential contamination from underground storage tanks, and potential radionuclides in aquifers.

(6) Continue to inspect all non-conventional OSDS periodically to ensure proper functioning.

(7) Assess the need to incorporate the use of “well reserve areas” for newly developed lots utilizing individual water supplies.

(8) Evaluate the need to establish well setback restrictions from roads to protect against road salt contamination.

Drinking Water Reservoirs

The Prettyboy, Liberty, and Loch Raven Reservoirs supply drinking water for 1.8 million people in the Baltimore region, including the 90% of Baltimore County residents within the URDL who rely on public water. The reservoirs and more than 17,200 acres of adjacent, mostly-forested land are owned and maintained by the City of Baltimore. Sixty-two percent of the reservoir watersheds are located within Baltimore County, and the remaining area is located in parts of three adjacent counties. This is the largest public drinking water utility in Maryland, with one-third of the State’s citizens dependent on the reservoirs in Baltimore County. Careful management of the entire watershed area for the three reservoirs is important for maintaining their water quality.

The City’s water quality monitoring program indicates that the reservoirs are adversely impacted by nutrient over-enrichment, including phosphorus from sewage treatment plants, agriculture, and urban development. The reservoirs are also experiencing increasing levels of chlorides and sodium from road de-icing as the mileage of roadways in the watersheds increases. Currently, the finished water supplied by the City contains 20 mg/l of sodium, the lower limit

recommended for individuals on sodium-restricted diets. Several Total Maximum Daily Loads (TMDLs) for nutrients and other water pollutants have been established for the reservoir watersheds.

Maintaining the good quality of reservoir water has been a cooperative regional effort for several decades. Baltimore County policies for the protection of the reservoirs were first adopted in 1972 in *GuidePlan 1980*. The 1978 regional water quality management plan recommended the creation of an inter-jurisdictional program to address nutrient and sediment pollution in the reservoir watersheds. In 1979, the first Reservoir Watershed Management Agreement was signed and later expanded in 1984 to include an Action Strategy and technical and policy committees to guide implementation. The Agreement was re-affirmed in 1990 and 2003, and followed by an updated Agreement and Action Strategy in 2005. The cooperative Reservoir Watershed Management program is coordinated through the Baltimore Metropolitan Council (BMC).

Forest is the most protective land cover for water quality. The adoption of the Urban-Rural Demarcation Line and the Resource Conservation (R.C.) zones have served as the primary management tools for reservoir protection in Baltimore County. R.C. zones cover more than 169,000 acres or 92.6% of the reservoir watersheds. Despite the protective zoning, more than 12,000 residentially assessed parcels have been improved in the reservoir watersheds on more than 31,000 acres. The County’s quadrennial Comprehensive Zoning Map Process has helped to reduce the potential for future development in the R.C. zones. With the creation of the R.C.6, R.C.7, and R.C.8 zones since the year 2000, more than 67,000 acres of higher density R.C.-zoned land have been further protected. With expanding requirements for meeting water quality standards and concern over new threats to water quality including sodium and chlorides from development, it is critical that the County’s commitment to applying its planning and zoning tools be maintained. This will help prevent pollution that would endanger public health or necessitate expensive water treatment measures.

Policy: Continue cooperative efforts to protect the quantity and quality of source water in the County’s three reservoir watersheds.

Actions:

- (1) Continue to participate in the regional Reservoir Watershed Management Program, including implementation of commitments in the 2005 Action Strategy.
- (2) Continue policy commitments to retain protective Resource Conservation zoning and to restrict creation of new development zoning in the reservoir watersheds.
- (3) Continue to implement non-point source pollution control practices for development and agricultural operations, stream restoration projects, and infrastructure maintenance in the reservoir watersheds.
- (4) Continue to establish riparian forest buffers and expand other forest cover in the reservoir watersheds in cooperation with private landowners, other agencies, and watershed organizations.
- (5) Continue to implement water quality monitoring programs in order to determine conditions and trends for reservoir quality and to assist in the implementation and evaluation of management programs.
- (6) Explore options to meet the need for road de-icing for public safety while reducing impacts on reservoir water quality.
- (7) Continue to prepare and implement Small Watershed Action Plans to address TMDLs for phosphorus, sediment, and bacteria.

THE CHESAPEAKE BAY, WATERWAYS, AND WATERFRONT AREAS

Baltimore County contains about 219 miles of Chesapeake Bay shoreline. The Bay and its tidal

Submerged Aquatic Vegetation (SAV)

SAV, commonly referred to as Bay grasses, is a critical indicator of water quality and provide essential ecosystem functions that improve the health of the County’s tidal waterways, as well as the Chesapeake Bay. SAV can function as a natural protection against sedimentation and erosion and the harmful impacts of pollutants including phosphorus and nitrogen. Additionally, SAV provides important food and habitat for waterfowl and aquatic species. SAVs are imperative to the overall vitality of the Chesapeake Bay and, Bay-wide, have been declining since the 1950’s due to degradation of water quality. In Baltimore County, SAV coverage has increased over 25% since 2000 due to improved regulatory programs and aggressive restoration efforts.

DEPRM monitors the location, density, and species diversity of SAV beds in 30 of the County waterways every spring and summer, and has developed an extensive database to determine trends and overall waterway conditions. The County implements projects to improve water quality and promote healthy conditions for the growth of these important Bay grasses by treating excessive upland runoff before it enters the waterways, reducing shoreline erosion and channelizing boat traffic.

tributaries – the Patapsco, Back, Middle, and Gunpowder Rivers – are a unique natural resource. The intertidal zone, land on which the tide advances and retreats, is essential for providing protection and food for waterfowl and aquatic life. These tidal waters also support Submerged Aquatic Vegetation (SAV) and are the spawning grounds for migratory fish species. Its health is fundamental to restoring the Chesapeake Bay, yet this area is threatened as a result of erosion and increasing human activities.

The Chesapeake Bay

Most of the County’s Chesapeake Bay shoreline is privately owned. This has limited Bay access to the individual lot owners in many places, and has impacted several stretches of shoreline with piers, bulkheads, and other structures. Baltimore County encourages the use of community piers as an alternative to private piers. Land development proposals are reviewed for compliance with the Chesapeake Bay Critical Area (CBCA) and redevelopment regulations. The County’s program was enacted in 1988, following the passage of the Maryland Chesapeake Bay Critical Area Act in 1984. Several updates to State and local Critical

Protecting the Chesapeake Bay

Maintaining water quality is a high priority for waterfront residents, businesses and visitors. Baltimore County has established a strong, comprehensive water quality program.

It includes initiatives to convert and retrofit stormwater management systems, restore streams, dredge waterways, stabilize the shoreline, establish vegetated buffers, and develop and implement comprehensive watershed plans. In addition, the Chesapeake Bay Critical Area law helps to protect water quality and sensitive waterfront areas by regulating development within close proximity of tidal water and tidal wetlands. The County, as part of the State of Maryland's commitment to protect the Chesapeake Bay from further environmental degradation, enforces this legislation.



Area programs to improve regulatory efficiency and effectiveness have been made over the last two decades. This program generally encompasses all of the land within 1,000 feet of tidal waters and the majority of the southeastern peninsulas. Tidal and non-tidal wetlands, shorelines, and streams are required to protect and establish naturally vegetated buffers, which filter the sediments and nutrients in runoff. A Buffer Management Program, adopted by the County for waterfront properties with historically disturbed buffers, allows for the continuation of maintenance activities and limited improvements within the buffer.

Sensitive undeveloped areas are also protected through Resource Conservation (R.C.) zoning, additional environmental regulations, and by maintaining the URDL. Zoning densities have been reduced on properties that are undeveloped consistent with the Critical Area law. Efforts to permanently preserve these lands that are important to the health of the Chesapeake Bay have also included the designation of much of the Coastal Area as a Maryland Rural Legacy Area. The County has built upon early State efforts in this area to permanently preserve over 1,000 acres of sensitive land.

Since the 1960s, the largest concentration of known septic system failures occurred in the Bowleys Quarters and Back River Neck peninsulas. Beginning in the mid-1980s the County began to address these problems comprehensively by extending public sewerage to these areas. As of 2010, over 90% of the estimated 3,000 failing septic systems in those areas have been connected to the public sewerage system.

In addition, the County is systematically evaluating all existing septic systems located within the Chesapeake Bay Critical Area to determine whether public sewerage or on-site sewage disposal upgrades will most effectively reduce nitrogen from these sources.

The Waterways

Baltimore County continues to implement the Waterway Improvement Program, an initiative to enhance and restore the quality of its water resources. The Program includes stream restoration, shoreline enhancement, water quality retrofits, and waterway dredging. The dredging program provides for the maintenance of existing boat channels in creeks and boat access “spurs” from these channels to individual waterfront properties. As part of the program, Baltimore County implements controls to reduce future runoff of sediment and nutrients to the dredged waterways. The County also maintains navigation aids in dredged waterways, providing safe navigation by directing boaters to deeper waters and allowing for restoration of shallow areas. These efforts improve water clarity, which is the key limiting factor for SAV growth. The Waterway Improvement Program also includes shore erosion control and restoration projects. This has stabilized thousands of feet of steep eroding shoreline with vegetated beaches and structural protection, such as offshore gapped breakwaters to control erosive wave energy. With the use of natural vegetation for stabilization, the County is introducing citizens to alternative shoreline protection approaches. These techniques are self-maintaining and therefore are a viable long-term solution.

In May of 2002, DEPRM implemented the “Clean Shores” Program, with the goal to improve the water quality, aesthetics, and navigational safety of tidal waters. Controlling the sources of debris in the waterways includes community education, enforcement of no-dumping laws, maintenance programs, and the installation of debris collection devices. From May to October each year, Baltimore County crews survey the tidal creeks and rivers and remove hazards to navigation and waterway debris from the shorelines and shallow waters. This Program has increased community awareness and encouraged community involvement in waterway clean-ups. Marking storm drains to warn citizens not to dump or litter is another effort to protect the Bay by bringing awareness to citizens.

The Waterfront Areas

The *Eastern Baltimore County Revitalization Strategy* (adopted as a master plan amendment in 1996) defines a vision for the waterfront areas that includes conserving and enhancing the existing waterfront communities, while attracting upscale housing development; creating economic opportunities, including tourism; and enhancing public access to the water. This vision requires balancing the use of the waterfront as a natural amenity, a recreational resource, a source of economic opportunity, and a place where people live.

Many of the permanent homes along the water were originally built as summer cottages on 50-foot wide



Living Shorelines

Living shorelines projects provide erosion control and ecosystem benefits utilizing green techniques as an environmentally friendly alternative to traditional armored shorelines such as bulkheads and revetments. Living shorelines generally consist of planted beach areas that stabilize the shoreline and create vegetative buffers to filter runoff and pollutants, while providing wildlife habitat. Living shorelines can also include the strategic placement of offshore gapped sills and breakwaters that reduce erosive wave energy while still allowing natural coastal processes to function. Baltimore County has implemented living shoreline projects in numerous waterways in an effort to protect County resources and enhance water quality.

lots. The addition of new housing on larger sites improves the diversity of the housing stock and helps to revitalize the waterfront communities. The addition of new housing could be accomplished through the consolidation and redevelopment of lots in existing neighborhoods or through the development of larger lot subdivisions where it is feasible. Although sites available for new development are limited, the CBCA regulations include a mechanism called “growth allocation” that allows for density increases on a limited amount of land in the Critical Area. To implement growth allocation, the County has established a committee consisting of representatives from various County departments to evaluate petitions for site design excellence and environmental sensitivity.

Baltimore County’s waterfront includes 26 County waterfront parks and two State waterfront parks. There are numerous recreational and business opportunities related to the Chesapeake Bay, such as boating, sail boarding, swimming, water skiing, fishing, crabbing, and bird-watching. Healthy beaches for swimming and aquatic populations are essential to Bay-related recreational and economic activities. Recreational boating contributes over \$200 million a year to the County’s economy. Baltimore County recognizes the importance of boating and is committed to providing a safe and clean environment.

Policy: Continue to implement water quality improvement measures in and along the waterfront, and continue to enforce water quality, forest, and habitat protection components of the State-mandated Critical Area law.

Actions:

- (1) Continue to implement the dredging component of the Waterway Improvement Program by maintaining channels and aids to navigation, while monitoring and protecting submerged aquatic vegetation.
- (2) Continue efforts to protect shorelines from erosion and improve the water quality and habitat value of tidal wetlands. Use living shoreline measures, where physically feasible, for shoreline stabilization, and enhance tidal wetlands.
- (3) Continue to implement the Clean Shore Program to improve the water quality, aesthetics, and navigational safety of the tidal waterways and increase community participation in waterway clean-ups.
- (4) Explore beneficial uses of dredge material disposal including shoreline stabilization projects and tidal marsh creation.
- (5) Maintain land use and development standards essential for the protection of the Chesapeake Bay's biological integrity.
- (6) Create effective opportunities for recreation, tourism, and rural legacy.
- (7) Design and plan projects to promote public access to the water and encourage public access to the water on private waterfront development projects, where appropriate.
- (8) Consider steering redevelopment efforts along the waterfront into historically disturbed buffer areas in order to maximize water quality protection and improvement.

(9) Consider steering growth allocations involving conversions to Intensely Developed Areas into priority funding areas.

(10) Educate and provide technical assistance for waterfront property owners about the benefits of living shorelines and promote appropriate behaviors to improve water quality.

(11) Evaluate existing private septic systems in the Critical Area for upgrades and connection to the public sewerage system.

(12) Encourage the implementation of clean marina best management practices.

(13) Continue to provide easement programs that provide financial benefits and flexibility of use to farmland owners to permanently preserve their farms and forests.

LAND RESOURCES

The land resources of Baltimore County, which include its minerals, soil, and biota, provide the foundation for economic and community activities. They are also an integral part of natural ecosystem processes, and how land resources are used not only affects terrestrial ecosystems, but also the quality of water and air.

Baltimore County's goals for land preservation are to permanently preserve at least 80,000 acres of land to protect agriculture and natural resources for future generations, recognize and promote sustainable agriculture as a vital economic, commercial and industrial activity, manage development to protect agricultural lands and prevent conflicts between agricultural operations and incompatible uses, and ensure the proper management of agricultural lands to protect water quality and natural resources.

Land preservation goals are achieved through the use of several comprehensive growth management measures: the URDL, zoning classifications, land use regulations, the purchase and donation of permanent conservation easements, and the implementation of recommended actions of the Master Plan.

Agricultural Priority Preservation Areas

The protection of land for agriculture has been a key component of rural growth management in the County for over 40 years. Significant public funds have been invested in the permanent protection of cropland, pasture and woodland to maintain and foster a viable agricultural industry. This forward-looking effort by the County has become more important with the national attention on issues such as energy conservation, sustainability, and national security. Promotion of local farms can improve the quality and security of the local food supply and play a role in solving other environmental problems.

The 1989 Master Plan first designated “Agricultural Preservation Area” boundaries (now called Agricultural Priority Preservation Areas, or APPA’s). These areas have been reconfirmed in subsequent plans. APPA’s are based on their capability for agricultural production and the existence of agricultural operations and preserved lands.

From 1980 through 2009, more than 55,200 acres have been preserved, including 21,675 acres under the Maryland Agricultural Land Preservation Foundation Program, 4,351 acres under the Baltimore County program, 25,250 acres under the Maryland Environmental Trust, private land trusts, and Rural Legacy programs, and 3,929 acres in R.C.4 cluster conservancy areas. This cumulative preservation achievement represents about 24% of the total land

area outside the URDL. Based on a 2006 study by The Conservation Fund, an additional 50,300 undeveloped, unprotected acres met agricultural program criteria. The protection of an additional 30,800 acres will be needed to meet the County’s ultimate preservation goal, and the County must seek adequate funding, explore innovative purchase techniques, refine programs, and increase the acreage of donated easements. Based on preservation of 2,100 acres and loss or conversion of 870 acres per year, it is projected that the 80,000-acre goal will be met by the year 2022.

Policy: Permanently preserve at least 80,000 acres of agricultural and natural resource lands through Conservation Easements and other similar legal instruments.

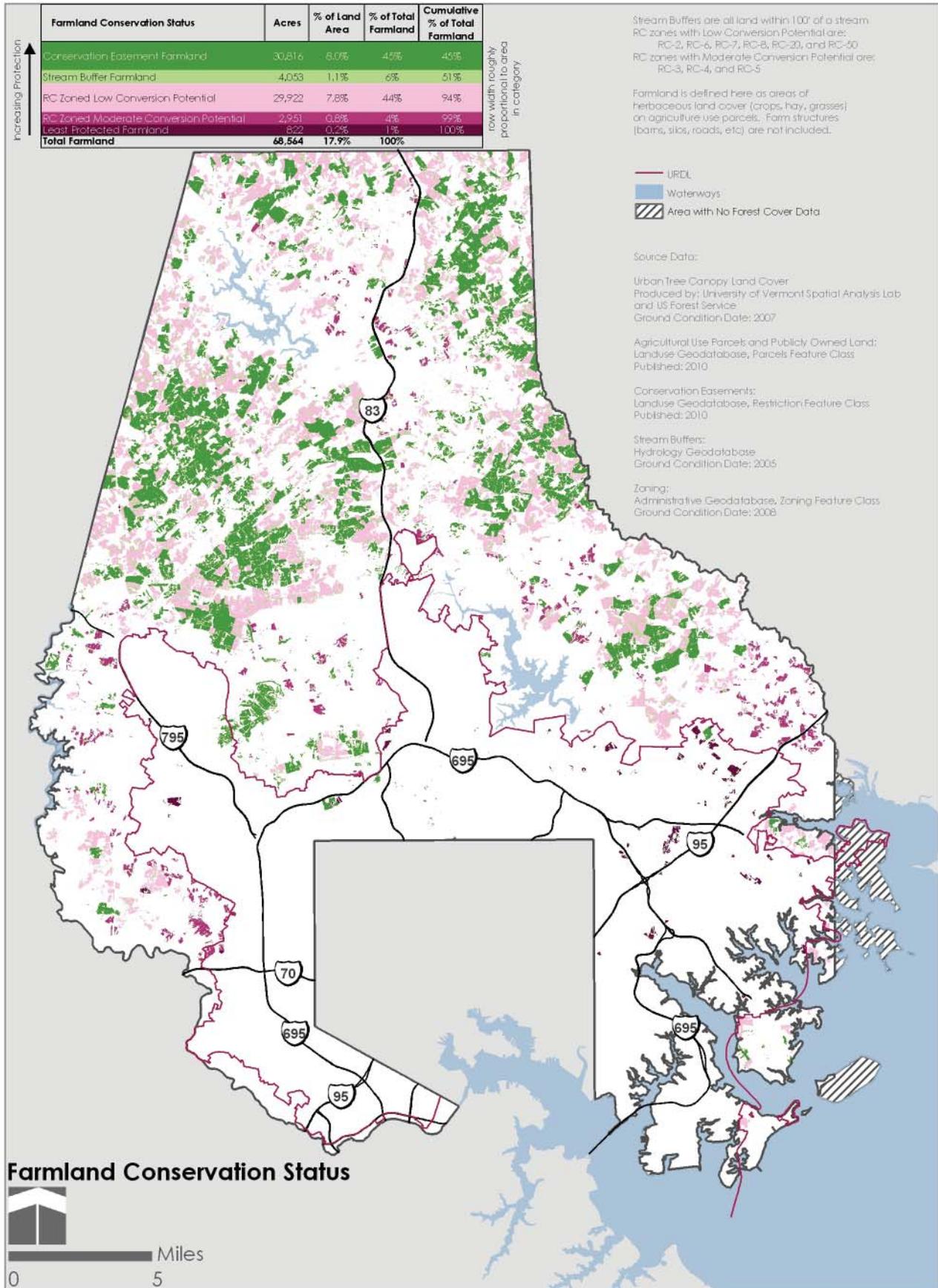
Actions:

- (1) Continue to seek and encourage the donation and sale of easements through the various land preservation programs.
- (2) Conduct landowner outreach and public education to increase awareness of these conservation programs and garner interest in land protection.
- (3) Identify and preserve parcels large enough to support normal agricultural and forestry activities.
- (4) Fairly compensate farmers for loss of development rights.
- (5) Monitor the Agricultural Priority Preservation Areas to ensure that at least 80% of the remaining undeveloped land is either under easement or temporarily protected by restrictive zoning (such as RC 2).
- (6) Work with state and local partners to monitor and steward existing conservation easements to ensure compliance with agreements to protect the County’s investments in agricultural land preservation.

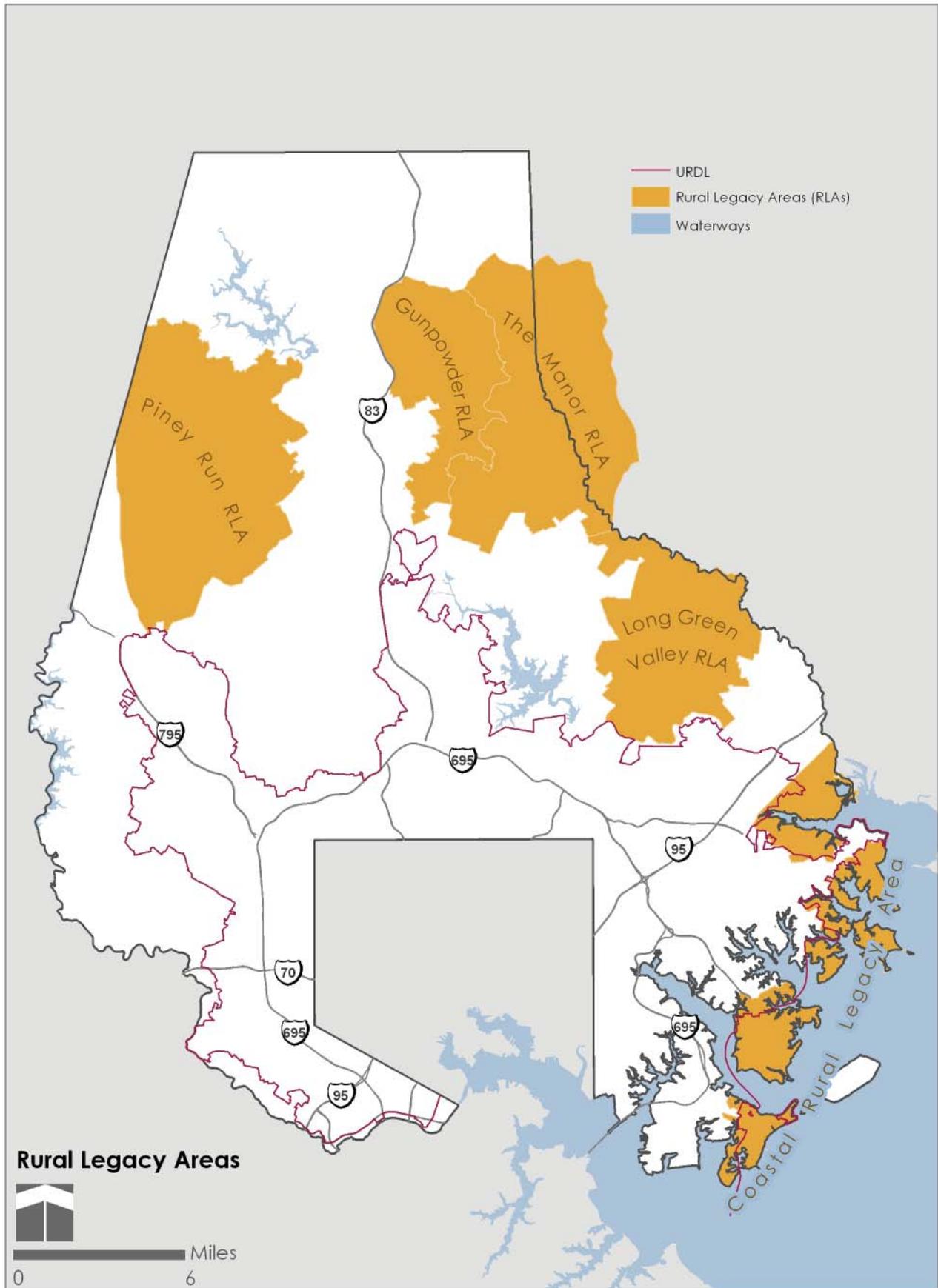
Land Preservation Progress

The United States Department of Agriculture states, “Agricultural land preservation constitutes sensible resource management for sustainable agriculture”. Baltimore County agrees, and further defines land preservation as an effective management tool for protecting and preserving natural and cultural resources. The County’s land preservation efforts are among the most successful in the nation. This success is in part due to the strategy of protecting land in the short term through restrictive resource zoning, and conserving land for the long term through preservation easements. Perpetual easements are the only way that preservation of the rural landscapes can be guaranteed. Fair compensation to landowners is provided to maintain the land in private ownership. Additionally, preserved privately owned lands stay on the tax roll.

Map 41: Farmland Conservation Status



Map 42: Rural Legacy Areas



(7) Continue to seek adequate funding to acquire easements on at least 2500 acres per year.

(8) As part of any update to this section of the Master Plan the County will:

- Determine progress towards meeting the goals of the MALPF;
- Evaluate any shortcomings in the County's ability to achieve the goals of MALPF;
- Determine and implement actions to correct identified shortcomings.

Rural Legacy Program

In 1997, the Maryland General Assembly adopted the Rural Legacy Program to address the continuing loss of natural resources and productive agricultural lands to development. The goals of the Program are to protect and maintain rural character, permanently preserve land through easement programs, and limit new residential growth in these areas. The Rural Legacy Program enables local jurisdictions and private organizations, such as Land Trusts, to apply for designation of significant areas as "Rural Legacy Areas." The County and its Land Trusts have received designation and funding for five Rural Legacy Areas: Coastal, Piney Run, Gunpowder, Long Green, and Manor (Map 41).

Policy: Manage growth within the designated Rural Legacy Areas and seek permanent preservation of undeveloped properties through easement programs.

Actions:

- (1) Work with local land trusts to monitor goals and accomplishments of Rural Legacy Areas.
- (2) Work with local land trusts to integrate comprehensive resource protection elements in Rural Legacy areas, including forest buffers, Chesapeake Bay shorelines, forest habitat, endangered species, and planning measures that reduce sprawl.

The Rural Legacy Program

The Piney Run Rural Legacy Area is among the most successful Rural Legacy Areas in the State of Maryland. The Rural Legacy area seeks to provide protection of the source water for the metropolitan drinking water supply through good land stewardship while also seeking to maintain the agricultural industry in the County. Over 17,000 acres of land have been protected through all preservation programs within the 32,320-acre Rural Legacy Areas. Of greatest significance is that through the use of the complimentary preservation programs and the targeting of Rural Legacy, a block of over 12,000 contiguous acres has been preserved. This is one of the largest blocks of land protected in this manner on the East Coast.

(3) Continue financial partnership with the State for preserving properties within Rural Legacy areas.

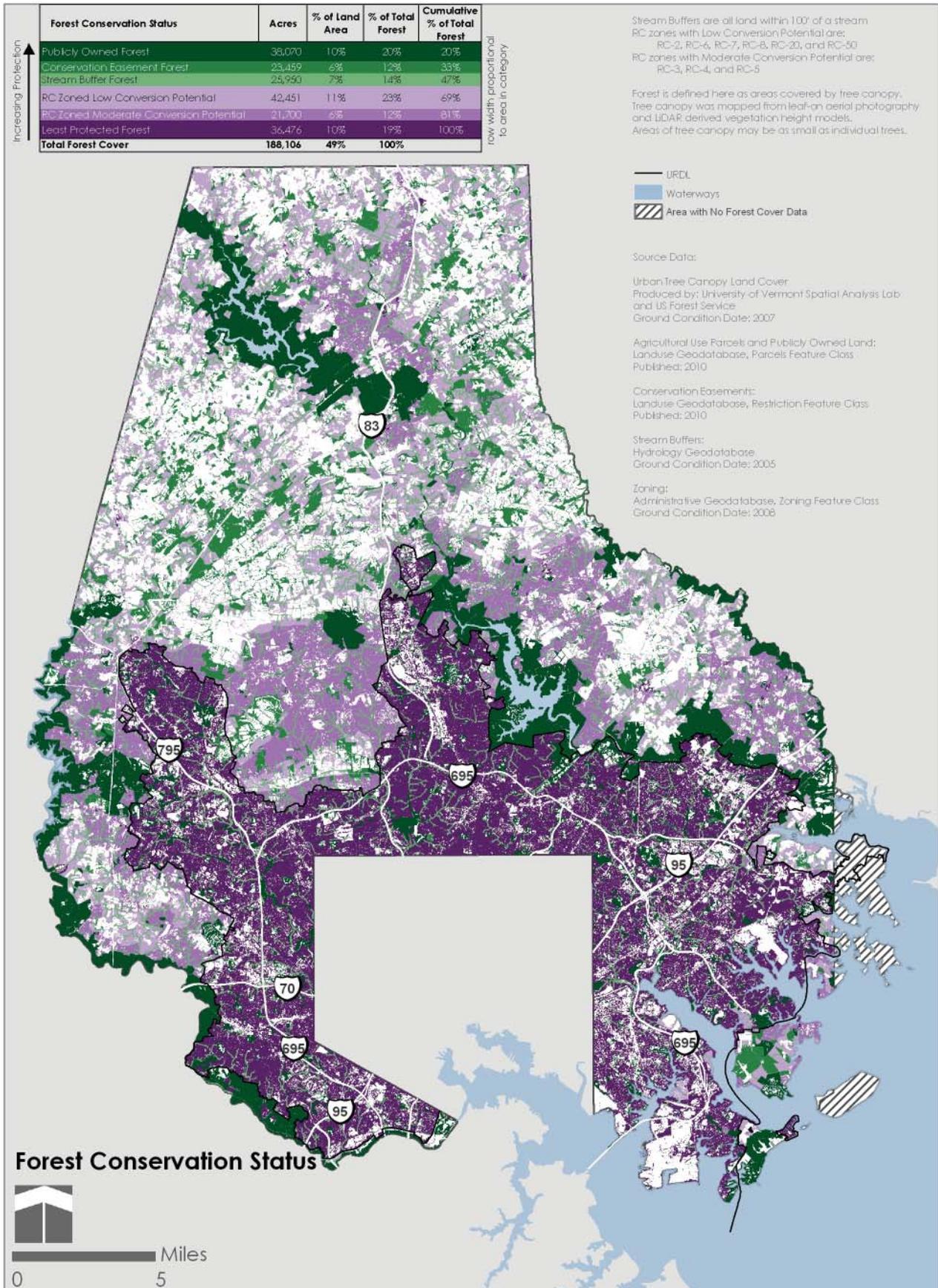
(4) Encourage donation of conservation easements to supplement purchased easements.

Forest Resources

Forests covered almost all of Baltimore County at the time of European settlement. Today, forests, agricultural lands, and developed areas each cover about 130,000 acres or one third of the County's land area. The largest forest blocks, totaling 30,800 acres, are public parks and reservoir reservations owned by the State of Maryland, the City of Baltimore, and Baltimore County. The County is placing its public forests under management plans that prioritize forest health and the protection of water quality, habitat, biological diversity, and the maintenance of forest-dependent recreation. Approximately 75% of the forests in the County are held in private ownership.

Historically, the greatest forest loss in the County occurred before the early 1900's, and there was a net increase in forest cover of about 17,000 acres from 1914 to 1997. Forest losses in recent decades have occurred as a result of land development. As a result of historical clearing, the forests in Baltimore County are fragmented into thousands of patches, most of which are smaller than 100 acres. Small patch size increases the forest's vulnerability to the many stresses imposed by the surrounding non-forested landscape, including temperature extremes, drying winds, air and

Map 43: Forest Conservation Status



Montreal Process Criteria & Indicators (MPC&I)

The MPC&I measure the ecological and economic sustainability of forest resources. These measures have been adopted by the U.S. and eleven other nations that collectively comprise 60% of the world's forests. Baltimore County uses the Criteria as goals. They include (1) Conservation of Biological Diversity, (2) Maintenance of the Productive Capacity of Forest Ecosystems, (3) Maintenance of Forest Ecosystem Health and Vitality, (4) Conservation and Maintenance of Soil and Water Resources, (5) Maintenance of Forest Contribution to Global Carbon Cycles, (6) Maintenance and Enhancement of Long-term Multiple Socioeconomic Benefits to Meet the Needs of Societies, and (7) Legal, Institutional, and Economic Framework for Forest Conservation and Sustainable Management. As a framework for sustainable forest management, the MPC&I have guided Baltimore County's efforts for forest assessment and program implementation. In addition to preparation of forest health assessments and management plans for forested County lands, an assessment of the urban tree canopy within the URDL was completed, and GIS analyses and typologies were developed (see the Forest Conservation typology under Sensitive Areas Protection). An estimate of the carbon dynamics of forestlands in the County was also completed. Programs to increase forest cover have been developed, including the Growing Home Campaign and rural reforestation projects with landowners. A case study of the development of the County's Forest Sustainability Program is available through The Conservation Fund (<http://www.baltimorecountymd.gov/agencies/environment/workgroup/index.html>). The County's Forest Sustainability Strategy and the State of Our Forests – 2007 report are also available. Information about the MPC&I is available from the national Roundtable on Sustainable Forests (<http://www.sustainableforests.net>).

water pollutants, and invasive species. The forests are also vulnerable due to a number of diseases and pests, and the lack of natural regeneration as a result of browsing by high populations of deer. These stressors can degrade forest health and reduce the forest's capacity to regulate critical watershed functions.

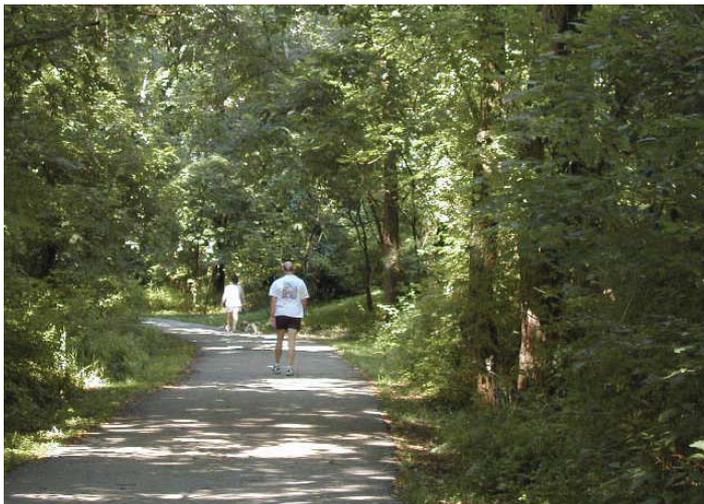
The multi-layered structure of the forest tree canopy and lower vegetation breaks the force of falling rain on forest soils, protects soil structure and the infiltration capacity of the forest floor. This function alone slows surface runoff, reduces erosion and soil loss, replenishes soil nutrients, and cleanses precipitation of pollutants as it moves slowly through the soil to adjacent streams. When forests become fragmented and degraded, flooding occurs more frequently, rushing streams threaten streambed stability, eroding

soils and excess nutrients foul stream waters, and the efficiency of the forest ecosystem to regulate watershed function for the health of both the human and wildlife communities is greatly impaired.

In addition to water management, other forest functions include the sustainability of habitat for the diverse plant and animal communities associated with the eastern deciduous forest, as well as a valuable industry of timber and other forest products. Forests also clean air and reduce the effects of greenhouse gases such as carbon dioxide through the sequestration and storage of atmospheric carbon. In urban areas, trees and neighborhood woods shade and cool buildings, thereby reducing energy demands and costs. Forests and trees improve public health, provide recreational opportunities, and enhance urban living.

To protect forest resources, the Chesapeake Bay Critical Area Act (1984) was enacted to regulate forest harvesting to protect the full range of forest ecological functions. Outside the Critical Area, forest conversion to development is subject to the County's Forest Conservation Act (1992), passed pursuant to requirements of the Maryland Forest Conservation Act, the nation's first statewide forest protection measure. Through these laws, developers are required to preserve or reestablish forests on development sites, utilize approved forest retention banks, or provide mitigation through off-site plantings or through the payment of fees to the County. The Critical Area Act is a no net loss measure, whereas outside the Critical Area, only forest losses exceeding allowable thresholds are required to be mitigated. From 1993 through 2006, more than 6,500 acres (65%) of forests on development sites were protected through the Forest Conservation Act (FCA). Another 3,200 acres (32%) of forests were cleared, averaging about 245 acres per year. Additional losses were incurred from activities exempt from the FCA regulations. Non-development timber harvests average about 700 acres per year but have declined since 2000. These harvest areas generally remain to regenerate.

In 2003, Baltimore County was invited by the U.S. Department of Agriculture - Forest Service to participate as one of three counties in the U.S. in the "Linking Communities to the Montreal



Process Criteria and Indicators (MPCI)” project. The MPCI are science-based measures of the ecological and economic sustainability of forest resources. This initiative led to the development of a Forest Sustainability Program within DEPRM that has included the preparation of a countywide Forest Sustainability Strategy in cooperation with a stakeholder steering committee. In addition to establishing a sustainability framework for forest management, a number of forest assessment and implementation projects have been completed. The County’s forest sustainability efforts are recognized nationally.

Policy: Continue to assure the sustainable management of public and private forest resources to provide ecosystem services and meet human needs.

Actions:

(1) Continue to protect forest resources pursuant to the Forest Conservation Act and

Chesapeake Bay Critical Area regulations, and continue to protect “forest buffers” as required by the County’s Regulations for the Protection of Water Quality, Streams, Wetlands, and Floodplains.

(2) Continue to implement the County’s Forest Sustainability Program and promote sustainable forest management among agencies, forest landowners, and environmental organizations, guided by sound science and assessment of forest health.

(3) Implement actions and commitments for forest management in the Baltimore Watershed Agreement, the Reservoir Watershed Management Agreement Action Strategy, and the County’s Sustainability program.

(4) Adopt and implement a No Net Loss of Forest policy.

(5) Continue to prepare Forest Health Assessments and implement Forest Management Plans for large County-owned forested properties.

(6) Continue to increase forest cover and maintain forest health using mitigation fees from the Forest Conservation Act and the Chesapeake Bay Critical Area Act.

(7) Continue to support the program of the County Forest Conservancy District Board.

(8) Include reforestation elements in community plans and community conservation projects.

(9) Continue to promote and support programs for community reforestation, including the Tree-Mendous Maryland Program, the County’s Growing Home Campaign, Rural Residential Reforestation projects, and Big Trees program.

(10) Continue the protection of forestland in the Coastal Rural Legacy Area through easements or in-fee acquisition.

(11) Address forest pests, diseases, and other biotic stressors and continue cooperative projects for suppression of Gypsy moths and control of exotic invasive species.

(12) Promote and implement efforts for sustainable waste wood and woody biomass utilization.

(13) Continue collaboration with the USDA Forest Service, the Maryland Department of Natural Resources – Forest Service and other agencies and organizations for the collection and use of forest assessment data and research and the implementation of sustainable forest management practices.

(14) Continue to implement and improve deer management measures to better protect forest resources. Evaluate and address the impact that deer browsing has on priority forest determinations.

BIOLOGICAL DIVERSITY AND SENSITIVE AREAS

In Baltimore County, a diverse assemblage of natural areas including forests, wetlands, stream systems, and fields currently provide breeding and foraging habitats for at least 340 animal species. As of 2007, however, 89 species of plants and 30 species of animals were classified as threatened, endangered, or extirpated from the region by the Maryland Department of Natural Resources. The ability of these natural communities to maintain biological diversity is threatened by the degradation and loss of natural habitat.

Biological diversity strengthens the resilience of natural ecosystems to withstand degradation. Natural disturbances are distinct, random events with recovery periods between disturbances. Disturbances caused by human activities, however, result in permanent changes, leaving no chance for the ecosystem to recover. The removal of native vegetation, forest fragmentation, environmental pollution, and the introduction of exotic invasive plant and animal species all degrade natural habitats, thereby reducing or eliminating native habitat suitability.

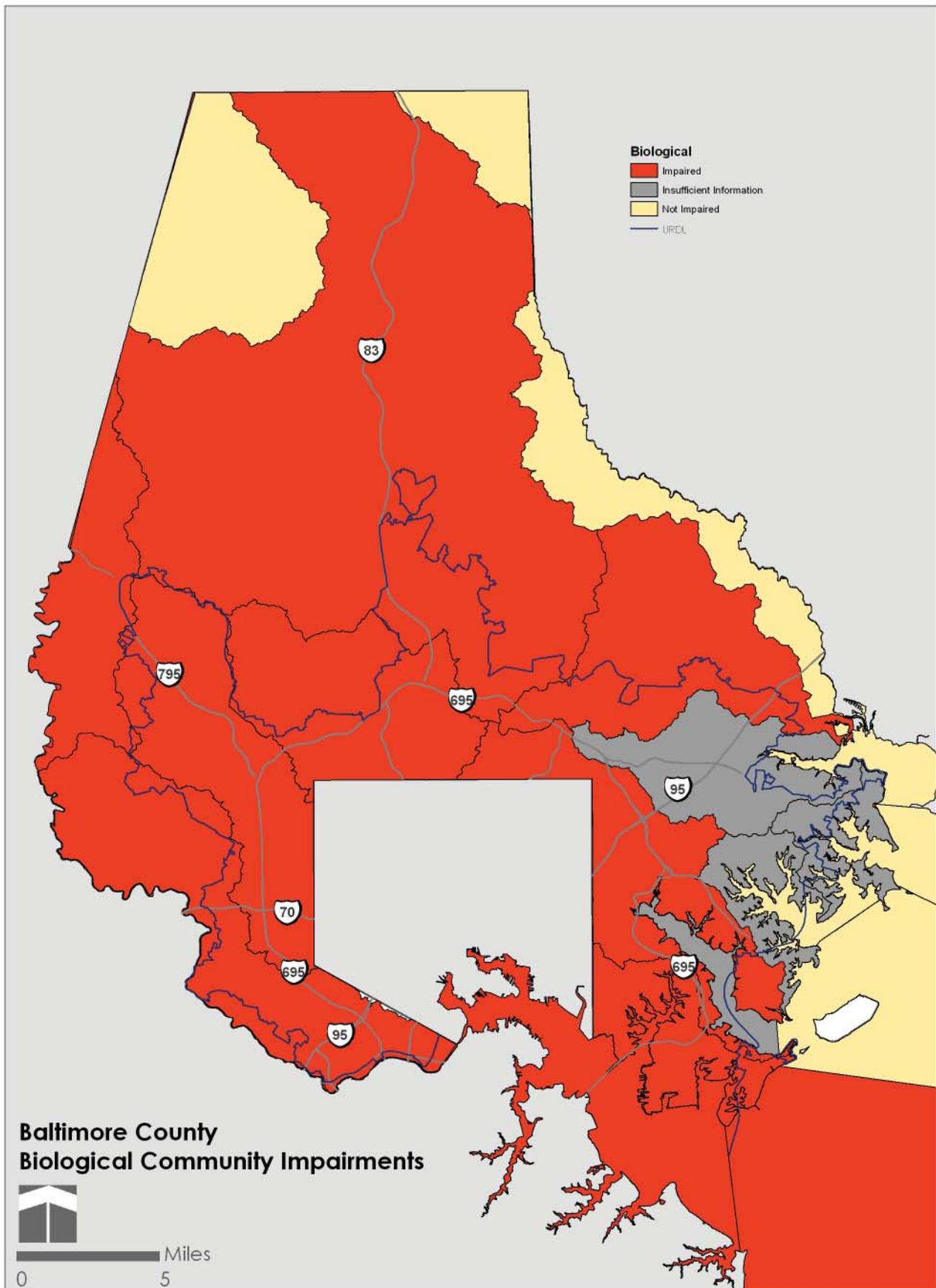
The maintenance of biological diversity is critical to the sustainability of both the human and wild communities.

Baltimore County is required under the Economic Growth, Resource Protection, and Planning Act of 1992 to incorporate a sensitive area protection element into its Master Plan. Sensitive areas are defined as streams and wetlands and their buffers, 100-year floodplains, habitats of threatened and endangered species, steep slopes, and agricultural and forest lands intended for resource protection or conservation. The intent of the Sensitive Areas element of comprehensive plans is to develop goals, objectives, principles, policies, and standards to protect sensitive areas from the adverse effects of development.

Baltimore County has made significant progress toward the protection of these resources through several local and State-mandated regulatory programs. In particular, the County's stream protection regulations, which have been a model by the Local Government Advisory Committee of the Chesapeake Bay Program, provide effective protection for stream channels and their 100-year floodplains, wetlands, and adjacent erodible soils and steep slopes. Outside of the Chesapeake Bay Critical Area, this comprehensive view of the "stream system" affords protection through sediment control, stormwater management, and forest conservation regulations. Within the Critical Area, these protection measures are supplemented by additional requirements to protect significant plant and wildlife habitats. Collectively, these measures ensure that adverse effects of development in unsuitable locations are avoided and that beneficial ecological functions of stream corridors for water quality, channel stability, and habitat are maintained and preserved.

DEPRM has also worked with the Maryland Department of Natural Resources to verify the presence of the limited number of threatened or endangered species and their habitats that exist in the County. Many of the habitats for these sensitive species are protected through public ownership of wildlands and other areas such as the Soldiers Delight Natural Environmental Area, and through the public drinking water reservoir reservations and large State-owned lands along the Patapsco River, Gunpowder Falls, and the Chesapeake Bay. Any threats to sensitive plant or animal spe-

Map 44: Biological Community Impairments



cies elsewhere from land development are addressed through regulatory protection of the stream systems, wetlands, and priority forest retention areas; and implementation of the Chesapeake Bay Critical Area Program.

The County's regulatory tools deal with immediate site-level threats to sensitive areas. In addition, the County's overall growth management framework provides an important mechanism for protection. The Urban-Rural Demarcation Line (URDL) restricts intensive urban development to only one third of the County's total land area, which generally surrounds the City of Baltimore. Outside of the URDL, a series of rural Resource Conservation (R.C.) zones has been in place since 1976 that provides protection for sensitive areas through restricted development densities and performance standards. As a result of the County's quadrennial Comprehensive Zoning Map process (CZMP), a significant acreage of R.C. zones have been further reduced in density $\frac{3}{4}$ especially beginning in 1996 $\frac{3}{4}$ providing enhanced protection. An additional mechanism is the County's land preservation programs that include the purchase of development rights on farmland, forests, and other sensitive lands.

The degree of protection for sensitive areas and other land resources in the County reflects a variety of tools, from public ownership to land conservation easements to low density zoning. Overall, more than 129,900 acres (69%) of the forest canopy in Baltimore County are under strong protection. An additional 64,800 acres of farmland (94%) are similarly protected.

Policy: Implement biological diversity protection measures for the County's diverse habitats and their dependent wildlife and the ecological processes that ensure healthy, productive, and sustainable ecosystems. Restore lost or degraded ecosystem functions, and foster environmental stewardship.

Actions:

(1) Develop a Biological Diversity Conservation Plan that includes measures to assess and protect the natural habitats of the County's listed rare, threatened and endangered species and sustainable acreages of forest, wetland, ri-

parian and early successional field habitats to maintain or improve biological diversity for current and future generations.

(2) Apply biological diversity conservation and improvement measures to the development plan review process, capital improvement projects, and forest restoration efforts.

(3) Work in cooperation with government agencies, non-profit organizations, and citizen groups to assess, protect, restore, and create a range of habitats.

(4) Maintain the extent of the URDL and Resource Conservation zoning to reduce the vulnerability of sensitive areas to conversion for development.

(5) Continue to implement multiple land preservation programs.

(6) Evaluate the vulnerability of high-value resource lands to conversion and recommend additional protection where appropriate.

(7) Utilize the Baltimore County Center for Maryland Agriculture to provide educational opportunities for good land stewardship.

(8) Support and promote the efforts of the Maryland Environmental Trust and local land trusts to protect sensitive lands.

MINERAL RESOURCES

Throughout its history, locally abundant and varied mineral resources have played an important role in Baltimore County's economic development. The County's geologic formations have provided recoverable reserves of clays, sands, and gravels throughout the County's Coastal Plain. Within the Piedmont physiographic province, the high-quality Cockeysville Marble was used for numerous building projects, innumerable row-house steps in Baltimore City, and renowned historic structures such as the Washington Monument in the District of Columbia. The Piedmont is also a source of other crystalline or hard rock re-

serves with great economic value, including iron ores, granites, gabbros, serpentines, and gneisses. While small mining operations were once prolific, competition from larger operations both inside and outside the County has reduced the number of active mining operations.

The primary issue regarding the mineral resources centers is that these resources are non-renewable and must be managed to remain accessible where economically recoverable to keep building construction costs competitive and to maintain self-sufficiency to the extent possible. For this reason, the State requires a Mineral Resources Element in each local comprehensive plan. In general, extraction of sand and gravel appears to be declining in Baltimore County, as evidenced by the closure of operations in the White Marsh area. Conversely, extraction operations at large hard rock quarries, such as at Cockeysville, appear stable and viable for the foreseeable future. Overall, there are no significant conflicts regarding the extraction of viable mineral resource reserves with areas planned for future development.

Policy: Recognize that mineral resources are an important and valuable element of the local economy. Develop appropriate land use policies to protect ongoing operations and prevent loss of these resources to other land uses.

Actions:

- (1) Restrict land development in undeveloped areas containing deposits of commercially valuable mineral resources.
- (2) Encourage a dialogue with the mineral resource industry to raise awareness of mineral resource-land use conflicts, and develop options for their resolution.
- (3) Permit mineral extraction activities in suitable areas pending environmental and community impact assessments.

(4) Design and improve road networks to handle the truck traffic from mining activities in areas presently or likely to be used for extraction of mineral resources.

(5) Assure that post-mining reclamation plans are compatible with surrounding land uses and comply with State Surface Mining Regulations.