

Section 7. Lower Perkiomen Creek Watershed Action Plan

Primary Goal: Ensure a clean, plentiful water supply that sustains human, plant and animal communities, supports a high quality of life and economic stability throughout the Lower Perkiomen Creek watershed.

Achieving this “water balance” is a major challenge. Water resources are vital to sustain natural and human communities. Community growth is also vital to ensure a vibrant and stable economy. As communities grow and expand, residential, industrial and commercial demands can tax water supplies beyond the point of recover without costly and environmentally disruptive human interventions. This Plan suggests that economic growth can be accommodated in a manner that does not degrade or deplete the water resources that support natural and human communities in the Lower Perkiomen Creek watershed.

The Action Plan is organized according to the Major Issues that affect the conservation of streams, wetlands, and ground water aquifers. Each section begins with one or more Goal Statements specific to the Lower Perkiomen Creek, followed by a series of Recommendations aimed at strengthening current regulations, land management, public education, etc., thereby increasing long-term watershed resource protections. The Major Issues, Goals and Recommendations are based on input from public meetings, survey questionnaires, interviews with municipal officials, and from research and analysis of data from a variety of sources.

Implementation of the Action Plan can take place on many levels ranging from individuals and non-profit organizations to municipalities and government agencies. Each may have a connection with a specific issue or project. They may be able to provide support staff or funding (e.g. the County Planning Commissions or Pennsylvania Department of Environmental Protection), undertake the project as part of their mission (e.g. Perkiomen Watershed Conservancy), or may simply be directly affected by the project (e.g. landowners).

It is important to realize that the issues affecting stream, wetland and aquifer protection tend to overlap, making their separation into these discrete topics somewhat artificial. An implementation strategy for one issue may also support the goals of another. The most important recommendations address many issues simultaneously. Rather than repeating similar information, the recommendations are placed under a single, most fitting issue.

LAND USE AND GROWTH MANAGEMENT

GOALS

- The overall pattern and intensity of land uses in communities throughout the Lower Perkiomen Creek watershed should:
 - Permanently protect critical environmental features such as streams, wetlands, floodplains, riparian woodlands, major forest blocks, vernal ponds and steep slopes from clearing, excavation and development.
 - Retain the traditional pattern of development in the area, with homes and businesses on smaller lots in or near existing hamlets, villages, towns and crossroads (where major roads and utilities already exist), and rural lots and large properties in areas dominated by farmland and woodlands.
- Increase the contiguous acreage of important natural areas that are permanently preserved through land conservation efforts.

RECOMMENDATIONS

1. **Update and strengthen municipal environmental protection ordinances, including those dealing with wetlands, vernal ponds, floodplains, riparian buffers, steep slopes and grading.**

Federal and state laws offer some protections to wetlands and floodplains. Steep slopes, vernal ponds and riparian buffers are generally only protected by municipal ordinances. Construction on these areas is naturally limited due to several factors however, local regulations can provide additional protections. Steep slope ordinances should greatly limit development and protect vegetation, particularly on slopes adjacent to the floodplain and small tributaries. Construction in these areas alters natural hydrology, eliminates critical habitats and accelerates erosion and sedimentation.

Implementation Partners: County Planning Commissions, **Municipal Officials**, Environmental planners and preservation organizations

2. **Adopt flexible zoning and subdivision standards that guide development toward more compact communities while establishing substantial areas of protected open spaces.**

Conservation oriented ordinances encourage a shift from conventional, larger lot residential development to smaller lots with substantial areas of protected open space encompassing sensitive natural features and historic resources. “*Traditional Neighborhood Design*” ordinances can reshape Highway Commercial areas from extended, single-use strips along major roads to multiple-use “nodes” at crossroads and existing developed areas. Model ordinances are available from county planning commissions, nonprofits, planning professionals and other communities.

Implementation Partners: County Planning Commissions, **Municipal Officials**

3. **Establish Transfer of Development Rights (TDR) programs.** TDR’s identify important “sending zones” (such as prime farmland and large forests) where important land areas should be protected and “receiving zones” (such as village extension areas or existing “nodes” of development) where higher development densities can be accomplished creatively and in an environmentally sensitive manner. Model ordinances are available from many sources. This approach is compatible with Agricultural Land Preservation, Effective Agricultural Zoning, Village Extension Overlay Zones and Joint Municipal Comprehensive Planning strategies.

Implementation Partners County Planning Commissions, **Municipal Officials**

4. **Adopt Village Extension Overlay ordinances.** Village Extension Overlay ordinances can be used in areas where important farmlands or woodlands adjoin existing villages or hamlets. Development densities are shifted from the protected resources to the area closest to the existing village or

Lower Perkiomen Watershed Conservation Plan
Excerpts: Section 7, Action Plan Recommendations

hamlet. The new development should be planned and designed to be compatible with the existing community. This approach is also compatible with Agricultural Land Preservation, Effective Agricultural Zoning and Transfer of Development Rights strategies.

Implementation Partners County Planning Commissions, **Municipal Officials**

- 5. Expand farmland preservation efforts via the County and State Agricultural Land Preservation programs.** A coalition of municipalities, county agencies and conservation groups is needed to address important issues including: greater consistency between actual appraised easement values and the per-acre price “ceilings” for purchasing agricultural easements; consideration of municipal funds as a match for County and State funds.

Implementation Partners County Planning Commissions, **Municipal Officials**, Local grange and farming organizations

- 6. Adopt Effective Agricultural Zoning where farming is a primary land use.** These ordinances can be used in conjunction with Transfer of Development Right programs, Village Extension Overlay zones and Agricultural Land Preservation programs to create zoning districts that support the viability of agricultural operations on minimum lot sizes of 25 acres or greater.

Implementation Partners: County Planning Commissions, **Municipal Officials**, Local grange and farming organizations

- 7. Recognize the value of regional planning among neighboring municipalities by adopting Joint-Municipal Comprehensive Plans and Zoning ordinances, as permitted under the Pennsylvania Municipalities Planning Code.** The scale and rate of development occurring in the Lower Perkiomen Valley affects entire landscapes and sub-watersheds. A coordinated, regional approach to land use planning among neighboring municipalities allows for more realistic growth management and resource protection than the conventional mosaic of small, fragmented plans. Regional comprehensive planning may be an important outcome of Act 167 Stormwater Management Plans and TMDL projects currently being conducted in the major subwatersheds of the Lower Perkiomen. Municipalities should also consider multi-municipal planning to address stormwater within watersheds rather than municipal boundaries.

Implementation Partners County Planning Commissions, **Municipal Officials**

- 8. Carefully review the potential environmental impacts of large-scale, heavy industrial uses.** Land uses such as major energy generation facilities, landfills, quarries, mining and other extractive activities can have community-wide environmental impacts. Areas zoned for heavy industry should be reviewed to ensure that they can accommodate or mitigate these impacts in ways that protect long-term environmental integrity and water supplies.

Implementation Partners: County Planning Commissions, **Municipal Officials**, local environmental organizations.

- 9. Coordinate education and outreach programs to raise awareness among landowners of land conservation options.** Conservation options may protect part or all of a given property, and may offer financial and tax benefits. Information about the importance of conservation, restoration and management of natural areas and the connections to water quality and quantity, biodiversity, and human health should be widely available.

Implementation Partners: Land trusts, watershed associations, municipalities, county and state agencies

- 10. Establish education and outreach programs to raise awareness of land restoration and management options among landowners and developers.** A wide range of restoration and management options are available that may address riparian forest buffers, invasive exotic

Lower Perkiomen Watershed Conservation Plan
Excerpts: Section 7, Action Plan Recommendations

vegetation, and the need for native meadows and reforestation as alternatives to lawns and old fields.

Implementation Partners: Local watershed and conservation organizations, **municipalities**, local developer's organizations, local chambers of commerce, municipal engineers and private consultants.

11. **Adopt Natural Landscaping Ordinances as alternatives to Weed Laws.** Such ordinances recognize the environmental and aesthetic value of meadows and naturally landscaped areas as alternatives to lawn, and encourage homeowners to pursue these approaches in a manner that avoids causing nuisances with neighboring properties. Municipalities may also enact a native plant species local provenance ordinance or an Invasive Exotic Plant ordinance to ensure that future plantings do not use known invasive species. New ordinances would legally affect only developments proposed after the enactment of the ordinance but could provide guidance to existing residential landowners and businesses.

Implementation Partners: County planning commissions, County conservation districts, **municipalities**, local watershed and conservation organizations

PROTECT AND RESTORE OPEN SPACE, WOODLANDS AND WETLANDS

GOALS

- Protect the water filtering capabilities and contiguous habitats of large blocks of “deep woods”.
- Protect existing wetlands throughout the Lower Perkiomen Creek watershed from excavation, filling and clearing of native vegetation.
- Protect wetlands, vernal ponds and woodlands with natural buffers when adjacent to land uses that impact water quality such as lawns, agricultural fields, roads, parking lots, stormwater basins and structures.
- Restore previously drained, filled or cleared wetlands and woodlands wherever possible.
- Document the native plants and animals that inhabit the watershed and constitute its biodiversity.

RECOMMENDATIONS

1. **Establish a GIS-based Lower Perkiomen Natural Areas Database.** A comprehensive database could include a broad range of critical natural resources including woodlands, wetlands and important flora and fauna populations. The database could be joined with other data in the area and could be accessible to local residents, groups and municipalities.

Implementation Partners: Local watershed and conservation organizations, **municipalities**, private foundations, schools and universities, county planning commissions, numerous state agencies

Woodlands:

2. **Adopt municipal woodland conservation ordinances to reduce the impacts of land development in priority woodlands.** Woodlands provide many vital services for water supplies and surrounding communities. Ordinances protecting them can focus either on penalties for removing trees or incentives for saving trees. To the greatest extent possible, public open spaces should preserve and enhance existing woodlands rather than transform them into active recreation and field-sport areas. Selective harvesting can occur without causing too much harm to forest and

Lower Perkiomen Watershed Conservation Plan
Excerpts: Section 7, Action Plan Recommendations

aquatic systems; however, local controls need to ensure that over-harvesting and clear-cuts are avoided, especially within riparian zones and on the steepest slopes, which have the most erodible soils.

Implementation Partners: County Planning Commissions, **Municipal Officials**, local environmental organizations.

- 3. Establish a Lower Perkiomen Woodland Conservation and Restoration Initiative.** Priority areas of existing forest networks should be identified in order to increase the size, shape, connectivity and health of these networks through reforestation and restoration. A variety of techniques and funding sources are available. Good initial candidates for conservation include priority woodlands near the Swamp Creek headwaters and along its lower reaches, Spring Mountain (identified as a high priority for conservation in numerous plans prepared by county and municipal agencies and conservation organizations), and other large wooded tracts along the Main Stem Perkiomen, and lower Skippack Creek. The Pennsylvania Forest Stewardship Program and Forest Legacy Program should be pursued where appropriate.⁹

Implementation Partners: Pa Department of Conservation and Natural Resources (PaDCNR), County parks and planning departments, **municipalities**, land trusts, local conservation and watershed organizations, and landowners

Wetlands:

- 4. Establish a watershed-wide initiative to accurately *identify and characterize* existing wetlands.** The preliminary wetland mapping prepared in this Plan can be expanded using a combination of aerial photo interpretation, Soil Survey and National Wetland Inventory (NWI) mapping, field verification, and in some cases wetland delineation. Characterization should be based on general wetland types including forested, shrub, emergent, wet meadows and other wet habitats such as vernal ponds. Wetland delineations conducted as part of municipal development submissions can gradually be added to a central wetlands database for each of the major sub-watersheds. Data should be compiled and regularly updated on the Lower Perkiomen GIS Database, currently maintained by Natural Lands Trust.

Implementation Partners: County Planning Commissions, **Municipal Officials**, local environmental organizations

- 5. Establish a Wetland Conservation and Restoration Initiative.** Broad partnerships should be established and maintained with the goal of permanent wetland protection throughout the watershed. A variety of techniques and funding sources are available to accomplish this action. Vernal ponds, often occurring in the springtime as shallow pools of water in floodplains, should also be protected as critical breeding areas for amphibians. Adoption of municipal riparian buffer and wetland protection ordinances should be promoted to avoid impacts from adjacent land development. Wetlands that have been altered by draining (tiling, ditching), excavation or filling, and potential areas for reestablishment of wetland soil, vegetation and habitat conditions should be identified for restoration. Programs such as the *PA DEP Wetland Mitigation Banking* program can provide funding for projects as a means of mitigating development impacts from projects located

⁹ The PA Forest Stewardship Program and Forest Legacy Program are voluntary programs to assist forestland owners with making ecologically-sound land management and land protection decisions. The programs are funded through the US Forest Service and administered by the PA Bureau of Forestry. For more information, visit the following websites <http://vip.cas.psu.edu/PAprogram.html> or www.fs.fed.us/spf/coop/programs/loa/flp.

Lower Perkiomen Watershed Conservation Plan
Excerpts: Section 7, Action Plan Recommendations

elsewhere in the region. Historic aerial photography, soils maps, and Soil Conservation Plans prepared for individual farms can provide clues about drained and filled areas.

Implementation Partners: Pa Department of Environmental Protection (DEP), Pa DCNR, County parks and planning departments, **municipalities**, land trusts, local conservation and watershed organizations, and landowners.

- 6. Protect and restore wetlands listed as high priority sites in county Natural Areas Inventories.** Natural Areas Inventories are discussed in Section 4. The drainage areas helping to supply water to these wetlands should also be prioritized for conservation to minimize the impacts of adjacent land uses.

Implementation Partners: County parks and planning departments, **municipalities**, land trusts, local conservation and watershed organizations, and landowners

Biodiversity

- 7. Conduct detailed surveys of native plant and wildlife communities.** Surveys should characterize the woodlands, wetlands, meadows and stream corridors, and assess species diversity, rare, threatened and endangered species. GIS and Global Positioning System (GPS) technology can accurately map key plant populations. The surveys also provide data for updating the Natural Areas Inventories prepared for Montgomery, Berks, and Bucks Counties.

Implementation Partners: Local botanists, naturalists, ornithologists, bird clubs, and biology programs from nearby universities, local watershed and conservation organizations

- 8. Conduct biodiversity management plans for protected natural areas.** Plans should distinguish between public use areas and areas reserved for critical flora and fauna populations. Natural habitats throughout the Lower Perkiomen watershed should be monitored annually, particularly in areas that currently support rare plant species and are in protected parks and nature preserves. Methods for removing invasive plants include manually removing the invasive plants, paying particular attention to removing all roots and seed-heads to avoid re-sprouting or new germination or spot spraying with a herbicide by a certified professional. Public education campaigns can inform local landowners of the issue and concerns and provide information about local demonstration sites.

Implementation Partners: County Parks Department, PaDCNR and state park personnel, local watershed and conservation organizations

PROTECT AND RESTORE RIPARIAN BUFFERS

GOALS

- Protect and restore full riparian buffers extending at least 75 feet from each stream bank for all streams throughout the **entire** Lower Perkiomen Creek watershed.
- Restore native floodplain forest vegetation, herbaceous wetland vegetation, meadow, and shrub vegetation to riparian buffers throughout the watershed.
- Establish management techniques and programs to ensure the long-term health and function of riparian buffers.

RECOMMENDATIONS

1. **Establish a Lower Perkiomen Riparian Buffer Initiative.** Broad partnerships should be established and maintained with the goal of protection, restoration and management of riparian buffers, particularly forested buffers. The Initiative should encourage the adoption of riparian buffer ordinances by municipalities. A *Riparian Buffer Assessment* has been prepared by the Heritage Conservancy and can be used as a basis for more detailed assessment of riparian corridor priorities. Voluntary protection and restoration of these areas on private lands should be promoted through easements, fencing, and reforestation.

Implementation Partners: Local watershed and conservation organizations, local volunteers, **municipal governments**, land trusts and landowners.

2. **Adopt Riparian Buffer Ordinances throughout the watershed.** Riparian buffer ordinances should protect a full riparian buffer zone of 75 to 100 feet on either side of a stream or wetland as part of land development or building permit applications. Buffers should either be protected as common open space or with conservation easements to minimize the risk of future reductions. Reforestation of unforested riparian buffer zones may be required as a mitigating measure and stormwater Best Management Practice. Riparian buffer ordinances can be freestanding, may apply to specific areas of degradation along streams and may include minimum alternatives for special conditions.

Implementation Partners: County Planning Commissions, PaDEP (Pennsylvania Stream ReLeaf manual) watershed and conservation organizations and **municipal governments**.

3. **Assist private property owners in finding funding sources for Riparian Forest Buffer protection/restoration efforts.** Landowners should be encouraged to consider implementing voluntary riparian buffer projects including streambank fencing, reforestation, and conservation easements.

Implementation Partners: County Conservation Districts, local watershed and conservation groups, PaDCNR, PaDEP, a variety of foundations and other funding sources.

4. **Develop riparian buffer restoration and interpretive demonstration projects at priority locations throughout the watershed.** Demonstration project sites at key locations can be incorporated into public education efforts to promote riparian buffer awareness. These projects can be developed as part of an overall Restoration and Management Plan for each site.

Implementation Partners: County Conservation Districts, local watershed and conservation groups, PaDCNR, PaDEP, a variety of foundations and other funding sources, public and private educational institutes, **municipal governments**.

5. **Identify priority needs for restoration of riparian buffers.** Throughout the watershed there are locations where the riparian buffers have been destroyed and significant environmental consequences are occurring. Owners of these areas should be contacted and all possible efforts should be made to assist in the restoration of functioning riparian buffers. Future forests and/or riparian buffer restoration activities should emphasize the underrepresented native species to reinstate biological balance. Reintroduction of native species will ensure that appropriate seed-sources are available to help increase long-term viability and balance of the common plant communities.

Implementation Partners: Local watershed and conservation organizations, sportsmen's organizations, **municipal governments**, local chambers of commerce or business organizations.

STORMWATER MANAGEMENT AND FLOOD CONTROL STRATEGIES

GOALS

- Maintain natural hydrology of each sub-watershed by reducing surface runoff and promoting groundwater recharge.
- Enhance the quality of ground and surface water by reducing sources of contaminated stormwater runoff and providing natural and constructed filters for stormwater runoff.
- Protect the health, safety and welfare of residents in the watershed and downstream communities by reducing flood hazards and damage.

RECOMENDATIONS

1. **Prepare and Adopt Act 167 Stormwater Management Plans for each major subwatershed.** Act 167 is the Pennsylvania Stormwater Management Act that authorizes DEP to provide funding for municipal implementation of stormwater programs. The programs implement Act 167 Comprehensive Stormwater Management Plans prepared by County Planning Commissions. Such plans provide specific requirements for stormwater management based on the specific hydrologic characteristics of the sub-watershed.

Implementation Partners: PaDEP, County Planning Commissions, **municipalities**, local watershed and conservation organizations

2. **Update municipal stormwater management ordinances to include innovative techniques or Best Management Practices (BMP's) to improve the quality of stormwater runoff and maximize groundwater recharge.** Newer techniques minimize sedimentation and other pollutants contained in runoff from developed areas and direct more stormwater runoff into the ground. Model ordinances provide municipalities a means of implementing watershed-wide Stormwater Management Plans as per Act 167 and US EPA National Pollution Discharge Elimination System (NPDES) Phase II requirements. This recommendation is consistent with the findings of the *Schuylkill River Source Water Assessment*.

Implementation Partners: PaDEP, County Planning Commissions, **municipalities**, local watershed and conservation organizations

3. **Establish a Stormwater Best Management Practices Retrofit Initiative.** A BMP retrofit program could identify existing problems and seek funding to implement updates. Identifying and addressing existing stormwater management problems (i.e. poorly designed basins, gully erosion problems, paved surfaces draining directly to streams, flooding) through incorporation of current stormwater Best Management Practices can greatly improve the quality and quantity of water in streams, wetlands and aquifers. Municipal stormwater ordinances should increase groundwater recharge and generally slow the movement of stormwater across the landscape, retaining the first $\frac{3}{4}$ inch of rainfall on-site and preserving the same volume of infiltrated rainfall as in predevelopment conditions.

Implementation Partners: Local watershed organizations, **municipalities**, PennDOT, Pa Turnpike Commission, Pa DEP and the county Conservation Districts

4. **Adopt updated municipal floodplain regulations.** Regulations should extend limits on development and re-development in floodplains and floodways, promote retention of natural floodplain soils and vegetation, and provide detailed requirements regarding safe storage of hazardous materials. Whenever possible, existing structures in areas that are prone to flooding should be removed to reduce the potential for loss of life and extreme property damage resulting from flooding. Open space preservation efforts could focus on areas adjacent to flood prone areas to provide additional floodways during exceptional weather conditions.

Implementation Partners: **Municipalities**, County Planning Commissions, Federal Emergency Management Administration (FEMA), Local watershed organizations.

PROTECT AREA WATER SUPPLIES (WATER QUALITY AND QUANTITY)

GOALS

- Manage growth to ensure that water supplies can be sustained within the natural carrying capacity of the local system of surface water and ground water.
- Manage land use and water resources to protect and guarantee the availability of clean, plentiful water as a drinking water supply for the millions of residents who rely on the Perkiomen Creek and Schuylkill River.
- Manage wastewater treatment and on-lot septic systems to ensure that ground and surface water supplies are protected.

RECOMMENDATIONS

1. **Prepare a Water Management Plan (or Integrated Resource Plan) for the Lower Perkiomen Creek watershed.** Water Management Plans and IRPs emphasize the concept of a *water budget*, for municipal adoption and establish water supply estimates considering ground and surface water supplies. They account for inter-basin water transfers – both exports and imports. They establish current water demand and project future water demand associated with growth over the next 20 years. Current water supply is then compared to the projected increased demand calculations to determine any potential shortfall. This Plan can allow municipalities to build upon Groundwater

Lower Perkiomen Watershed Conservation Plan
Excerpts: Section 7, Action Plan Recommendations

Protected Area withdrawal limits set by the Delaware River Basin Commission. An Integrated Resource Plan is underway in the central Swamp/Scioto sub-watershed.

Implementation Partners: Private consultants, county Planning Commissions, Delaware River Basin Commission, **municipalities**, local watershed and conservation organizations.

2. **Link Water Management and/or Integrated Resource Plans to municipal land use planning.**

The proposed build-out density of communities should be based on the sustainable water supply calculations within the watershed. Imports of water from other watersheds should only be considered as a last resort for accommodating future growth. To the greatest extent possible, the quality and quantity of surface and ground water sources within the watershed should be determining factors for growth density and location. More limited land use practices may be necessary to protect the quality or quantity of water in the Leithsville area or other limestone aquifers. Careful testing should be done prior to development in limestone areas, and stormwater and septic systems should be designed to avoid concentration of subsurface water – the primary factor leading to sinkholes.

Implementation Partners: Local watershed organizations, **municipalities**, County Planning Commissions, Delaware River Basin Commission

3. **Adopt wellhead protection ordinances.** Wellhead protection ordinances ensure protection of public health, prevent groundwater contamination, prevent the need for costly treatment for compliance with drinking water standards, and promote sound land use planning. Existing community wells and “cones of depression” where ground and surface water is drawn into wells need to be identified and buffer areas established to limit land use impacts to wells. Overlay zones should be established to strictly limit or eliminate hazardous waste and impervious cover in wellhead protection areas.

Implementation Partners: Local watershed organizations, **municipalities**, County Planning Commissions.

5. **. Inventory and assess hazardous materials storage practices, locations and hazardous waste sites throughout the watershed.** Ordinances that set detailed requirements for safe and proper storage, transport, disposal and cleanup of hazardous materials should be prepared and adopted. In addition, Emergency Response Planning and an early warning system are recommended in the *Source Water Assessment for the Schuylkill River*.

Implementation Partners: **Municipalities**, PaDEP, County Health Departments, water supply utilities

5. **Avoid inter-basin transfers of water wherever possible.** Closely examine transfers between sub-watersheds for their impact on the hydrologic balance of the watershed. The priority in maintaining hydrologic balance is to avoid negative impacts to the baseflows and ecology of streams, wetlands and groundwater levels supporting local wells.

Implementation Partners: County Planning Commissions, **municipalities**, water supply utilities.

6. **Increase water conservation measures in households and businesses throughout the watershed.** Water-saving appliances, fixtures and habits should be encouraged among all

Lower Perkiomen Watershed Conservation Plan
Excerpts: Section 7, Action Plan Recommendations

watershed residents and businesses. Numerous sources are available for water conscious appliances and fixtures. Public education remains the larger hurdle to reducing residential and industrial water usage rates.

Implementation Partners: County Planning Commissions, **municipalities**, water supply utilities, local watershed and conservation organizations.

7. **Coordinate Act 527 Plans among municipalities on a regional, watershed basis.** Act 537 Plans should encourage improved technologies for biological treatment of wastewater effluent to reduce contaminants, particularly phosphorus, nitrates/nitrites, and fecal coliform bacteria, and to prevent transmission of microorganisms such as cryptosporidium. Over time, alternatives to stream discharge of treated sewage effluent should be considered in favor of land application technologies such as drip irrigation, spray irrigation constructed wetland systems and Living Machines/Natural Water Treatment Systems (www.oceanarks.org/natural).

Implementation Partners: County Planning Commissions, **municipalities**, wastewater treatment authorities, local watershed and conservation organizations.

PONDS AND DAMS

GOAL

- *Reduce artificial heating of stream water, fragmentation of streambed and stream channel, and loss of wetlands caused by on-stream ponds and impoundments.*

RECOMMENDATIONS

1. **Inventory and characterize ponds, dams and impoundments and prioritize removal candidates.** This initiative should identify ponds and impoundments and determine their function, ownership, ecological benefits (such as bird species diversity, associated wetlands, or fire control), impacts (thermal pollution, stream fragmentation, wetland loss) and cultural benefits (such as fishing, boating or historic significance). Prior to recommendation of any dam removal project, environmental impact assessments should be conducted to determine: potential loss of habitat for plant and animal species; the potential for stream contamination from release of trapped sediments; potential loss of public recreational and cultural resource. This information can augment the Dam Inventory of this Plan.

Implementation Partners: Pa Fish and Boat Commission, local sportsmen's organizations, community organization, **municipalities**, local watershed organizations

2. **Establish and promote standards for restoration of existing ponds and construction of new ponds.** Standards should be established in order to maintain stream water quality in the Lower Perkiomen as a public water supply, recreational resource and high quality habitat for a rich diversity of aquatic life. Design standards should include criteria for siting, minimizing solar exposure (i.e. orientation, shape and shade trees), techniques for discharging cooler water instead of heated water, native vegetation buffer areas and techniques to discourage Canada goose populations.

Implementation Partners: County Planning Commissions, PaDEP, local agricultural organizations, local watershed organizations, local sportsmen's organization,

EXPAND PUBLIC AWARENESS OF CONNECTIONS BETWEEN ENVIRONMENTAL ISSUES AND QUALITY OF LIFE

GOALS

- Increase public support for long-term conservation, management of surface and ground water quality and quantity and involvement in watershed conservation activities.
- Increase public awareness of the economic value of preserving environmental resources and maintaining high community quality of life.
- Increase enjoyment and appreciation of the Lower Perkiomen Creek watershed by residents and visitors through expansion of active and passive recreation activities.
- Expand the existing economic benefits of fishing, eco-tourism and recreational tourism.
- Increase the number of communities with Environmental Advisory Councils (EAC's), the locally-based environmental organizations permitted under the Pennsylvania Municipalities Planning Code.

RECOMMENDATIONS

1. **Establish and coordinate education programs and restoration projects in communities throughout the Lower Perkiomen Valley.** Participation in education and restoration programs provides individuals great opportunities to understand critical environmental issues and take personal actions to promote changes. Public programs also have greater ability to address watershed awareness and coordinate restoration projects.

Implementation Partners: Local environmental organizations, public service groups and **municipalities**, professional organizations, corporations, and local businesses, volunteer service organizations, neighborhood associations, boy scout and girl scout groups, and students.

2. **Expand outreach efforts to schools and service organizations to provide watershed educational/informational presentations and volunteer opportunities.** Links between land use and water resources should be stressed.

Implementation Partners: Local environmental organizations, public service groups and **municipalities**, professional organizations, corporations, and local businesses, volunteer service organizations, neighborhood associations, boy scout and girl scout groups, and students.

3. **Support Pennsylvania's Academic Standards for Environment and Ecology.** Local watershed organizations are positioned to provide hands-on educational experiences that excite students about the world around them using a holistic approach to watershed education involving field studies, identifying solutions to watershed problems, and student participation in restoration projects along streams and wetlands. Long-term demonstration projects could be established in different school districts to provide opportunities for students to participate in soil preparation, seeding and planting of native vegetation, and ongoing vegetation management and learn about the water quality and quantity benefits of their work. Restoration goals can include establishment of native forest, wetland, stream and meadow communities.

Lower Perkiomen Watershed Conservation Plan
Excerpts: Section 7, Action Plan Recommendations

Implementation Partners: School Districts, local watershed and environmental education organizations

4. **Develop a training program for Environmental Advisory Councils.** EAC's should be encouraged throughout the watershed to monitor and provide advocacy and information on key environmental issues affecting environmental resources. A watershed-wide coalition of EAC's could create a unified voice for issues affecting municipalities throughout the watershed.

Implementation Partners: Pennsylvania Environmental Council, local watershed and conservation organizations

5. **Expand the number of open space properties, greenways and trails that are available for public use including non-profit institutions, private corporations or individual property owners with large land holdings.** Trails along streams and other open space corridors provide opportunities for individuals and groups to "feel" the importance of natural areas and the flora and fauna they support. Trail corridors should include links to the Perkiomen Trail, Evansburg State Park, municipal open space, creeks and streams and other protected open spaces. Municipal Open Space Plans and management plans are critical tools for establishing and maintaining these linkages.

Implementation Partners: Counties, **municipalities**, local businesses, local conservation and watershed organizations, individual landowners.

6. **Consider strategies for marketing sections of the Lower Perkiomen watershed as a destination for fishermen, boaters, bird watchers, bikers, hikers and hunters.** Attracting open space users from outside the region provides economic opportunities for local businesses and property owners. Special care must be taken to ensure that impacts from these activities are minimized and that open space users are provided with information regarding the special nature of the areas in use.

Implementation Partners: Counties, municipalities, local businesses, local conservation and watershed organizations, individual landowners, chambers of commerce, sportsmen's and recreational organizations.