DRAFT

Executive Summary

Commonwealth of Pennsylvania
State Water Plan Principles

August 2008

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A VISION FOR PENNSYLVANIA'S FUTURE

Pennsylvania has abundant and magnificent water resources. These resources should provide the basis for an exceptional quality of life for Pennsylvania's residents, an opportunity for outdoor enthusiasts, an attraction for visitors, unparalleled natural beauty, thriving ecosystems, agriculture prominence, and economic prosperity throughout the Commonwealth. All those with an interest in Pennsylvania have a stake in the use, enhancement, and stewardship of the state's water resources. Indeed, the Pennsylvania Constitution vests a right to pure water and the values of the natural environment in all Pennsylvanians, and imposes a duty to conserve and to maintain public natural resources for this generation and generations yet to come.

In order to achieve this vision, the State Water Plan will offer tools and guidance for all those who make decisions that affect the Commonwealth's water resources or who make decisions based upon the availability of water of adequate quantity and quality. The plan should be useful to those who wish to locate and to design their projects so that the availability of water resources does not constrain them; those who wish to preserve high environmental quality where it exists and to achieve it where it does not; local governments with planning, conservation, and economic development responsibilities; and Commonwealth and interstate compact agencies. This plan should serve their needs by providing a qualitative and quantitative description of water resources in Pennsylvania based upon accurate, transparent, and readily accessible data, and guidance on the use of that description and those data in the decisions that face the plan's users. The plan is a starting point for considering the opportunities available to Pennsylvanians for managing the state's water resources to achieve our vision for the Commonwealth.

PREFACE

This State Water Plan replaces an outdated plan that was completed in 1983. The obsolescence of the current State Water Plan led the Department of Environmental Protection (DEP) to conduct a series of 16 water forums in the spring of 2001 that sought opinions from the public about water resource management. The forum helped DEP set its strategic water resources management agenda, and generated grass roots support for legislation to require adoption a new State Water Plan. The Water Resources Planning Act, signed into law on December 16, 2002, established a Statewide Water Resources Committee and six Regional Water Resources Committees that are charged with guiding DEP through the development of a new State Water Plan and updating it at five year intervals.

This updated State Water Plan seeks answers to the following questions: How much water do we have? How much water do we use? How much water do we need? As a functional planning tool, this updated water plan provides Pennsylvanians with a vision, goals and recommendations for meeting the challenges of sustainable water use over a 15 year planning horizon. The plan consists of inventories of water availability, an assessment of current and future water use demands, assessments of resource management alternatives, and proposed methods of implementing recommended actions. It also analyzes problems and needs associated with specific water resource usage such as navigation, stormwater management, and flood control.

All actions taken to implement the recommendations of this plan, and all steps taken to update the plan will be documented and be instantly accessible through DEP's worldwide web site. This process will directly engage the public by seeking opinions and priorities that will guide the Committees and DEP in developing statewide priorities, and exploring issues and trends as they emerge.

NATURAL RESOURCES PROTECTION

Protecting and enhancing Pennsylvania's water resources is the overarching theme that resonates throughout this plan. Pennsylvania has over 86,000 miles of streams and rivers, 161,455 acres of lakes, and is underlain by enough groundwater to submerge the entire state beneath eight feet of water if it were brought to the surface. Pennsylvania also holds 63 miles of Lake Erie shoreline, 17 square miles of Delaware Estuary, 512 acres of tidal wetlands, and 403,924 acres of freshwater wetlands[1]. These waters and wetlands are home to over 1200 kinds of insects and other invertebrates, 30 species of amphibians, 19 species of reptiles, and 221 known species of fish. These formidable resources supply water to maintain a vigorous economy, productive farms, numerous water-dependent recreational activities, and the daily needs of nearly twelve and a half million Pennsylvanians. Such a wide variety of uses inevitably generates competition and sometimes creates conflict among users. The fundamental intent of this plan is to identify and recommend strategies to avoid and resolve such conflicts, and ensure that water demands are met in a sustainable manner while providing natural resource protection.

[1] 2008 Pennsylvania Integrated Water Quality Monitoring and Assessment Report, April 2008

WATER USE TRENDS – TOMORROW'S FORECAST

Water resources planning and management strategies draw heavily on the past to assess the present and predict the future. Historic information is routinely used to forecast floods, assess water availability, control stormwater runoff, manage droughts, and protect the aquatic environment. The practice of looking in the rear view mirror to steer forward, however, may be coming to an end. Climate change and varying water use demands may soon cause current assumptions and models to become outdated and inaccurate. In response, a new generation of models, projections, planning guidelines, design parameters, and management policies may need to be developed that are adaptable to dynamic conditions and capable of providing a clear picture of the future.

Pennsylvanians withdraw about 9.7 billion gallons of water every day from a variety of surface and ground water sources. The thermal electric power industry is responsible for approximately 70% of those withdrawals. Public water supplies make up about 15% of statewide water use while industries use roughly 12%. Mining and agriculture account for close to 2% and 1% of water use, respectively. These current water use patterns will continuously evolve. Population shifts, energy demands, farming practices, infrastructure management, consumer sophistication, national and international policies, and climate change will all influence how water resources are managed over the next several decades. This State Water Plan is the initial step of a continuous process that will strive to provide reliable and current guidance for recognizing and addressing water resource trends and needs as they materialize.

STATE WATER PLAN PRIORITIES

Principal Priorities

The three principle priorities of this State Water Plan are noted below:

- The efforts initiated in the plan to collect, interpret, and disseminate water resources information should continue into the future.

- An integrated approach to managing water resources should be encouraged and sustained.

- The Commonwealth should adopt policies that encourage technological advances designed to conserve and enhance water resources.

Regional Priorities

Each of Pennsylvania's major drainage basins has an array of individual characteristics that distinguish it from other regions of the state. To reflect these variations, six Regional Water Resources Committees were created by the Water Resources Planning Act to ensure that individual regional priorities were highlighted in the plan. The following water resource management priorities were established by these six committees.

Great Lakes

- Support legislation and other measures that will protect the quantity and quality of water in Lake Erie

Recognizing that protection of the entire Great Lakes system is crucial to protecting Lake Erie, close coordination with the surrounding states and Canadian provinces is key to meeting this goal. The committee recommends support for the Great Lakes Annex Agreement, and state and federal legislation to accompany and support the implementation of this agreement.

- Maintain the hydrologic integrity of the region by evaluating and addressing land use changes and their effects on point and non-point source pollution, recharge, flow, and the surface and groundwater regimes and establishing the capacity to do so

The ability to manage land use and development to minimize their influence on natural resources is currently limited by the planning policies in this region. Municipal land use ordinances should address conservation design and additional safeguards and include incentives for developers to take this approach. Reaching

out to local regulators and providing them with the tools necessary to make these important land use planning decisions is imperative.

Ohio

- Reclaim water resources impaired by abandoned mines

The committee recommends that a full assessment of all water resources impaired by drainage from abandoned mines be conducted, and that incentives and new technologies for the mining industry and others be developed to reclaim or reuse these waters.

- Identify water resources needed to promote and facilitate economic development and provide job opportunities, while maintaining watershed integrity and recreational benefits

The committee has suggested working with water supply data, regional economic development groups, and the Southwest Pennsylvania Commission to achieve a balanced approach to support economic growth and environmental goals. Encouraging water-based recreation and tourism is also an important component of this priority. In addition, the committee recognizes that sewage problems in the region have the potential to impair economic development, and considers proper sewage disposal to be among the top issues to address for the Ohio basin.

Delaware

- Linking land use decisions and water resources management

Linking land use decisions and water resources management is a top priority of the committee to sustain and enhance the quality of life in the Delaware River basin.

- Improve management of water resources (including stormwater and wastewater) and waterway corridors to reduce damages from extreme conditions (floods and droughts)

Actions will be needed at the state, regional, county and municipal level to: manage stormwater to address the impacts of both floods and droughts and improve the quality of life in our communities; identify riparian corridors and flood plains and optimize their multiple natural benefits; and maximize the use of water conservation techniques.

Lower Susquehanna

- Evaluate supply and demand

The committee has identified finalizing accurate water supply and demand projections to improve the capability to plan for the social, economic, environmental and recreational needs of the Lower Susquehanna region as a leading priority. This information serves as the basis for decision making on land use planning, identifying and analyzing Critical Water Planning Areas, and better preparation in advance of extreme flood and drought conditions.

- Protect "at-risk" water resources and reduce or prevent point and nonpoint source pollution with a focus on impaired streams

This region has a significant number of impaired streams (approximately 3,400 miles, 20% of total stream miles) caused by various point and nonpoint sources of pollution. A major priority of this committee is to reduce or prevent this pollution and to focus added attention on “at-risk” water resources.

Upper / Middle Susquehanna

- Protect important headwater habitats and recharge areas of the Upper/Middle Susquehanna River basin

To care for the water resources in the Upper/Middle Susquehanna Basin and to ensure a sustainable supply of quality water, important headwater habitats and groundwater recharge areas must be protected. Working collaboratively with various interest groups and coordination with local government to promote sound land use practices and appropriate zoning ordinances in public water supply recharge areas is particularly important in areas with limited availability of quality water. The committee also recommends that well construction standards be implemented, particularly related to residential well drilling, that will protect and sustain groundwater quality and availability.

- Address the consequences of acidic drainages on receiving streams to improve and protect water quality, aquatic ecosystems, and enhance the availability and utilization of water

Acidic drainage from abandoned mines has devastated miles of streams in this region. This legacy pollution and potential future disturbances of acid-producing rock must be addressed to improve and protect overall water quality, aquatic ecosystems, and to enhance the availability of water.

Potomac

- Address land use planning and growth

Managing growth is a critical priority in the Potomac Basin as more and more residents and businesses migrate into southern Pennsylvania, particularly from neighboring Maryland. Considering this development pressure, the Potomac Region needs a strategy to manage water supply and demand that relies on scientifically based data and principles for land use planning. The committee recommends implementing sound land use practices, comprehensive regional planning, a regional regulatory program, and providing local governments with tools to properly manage water resources when faced with prioritizing competing land use decisions.

- Develop land use programs that protect water quality and quantity and preserve the ecological integrity of groundwater and surface water, including springs, streams, lakes, and wetlands

A major priority of this committee is to develop land use programs that protect water quality and quantity, and preserve the ecological integrity of groundwater and surface water, including springs, streams, lakes, and wetlands. The committee recommends a water quality objective that encourages municipal programs to include domestic well construction standards, riparian buffers and vegetated systems, and the protection of the natural soil mantle.

INTEGRATED WATER RESOURCES MANAGEMENT

Recommendations

Integrated water resources planning and management offers a direct and efficient way to confront complex topics and concerns as they emerge from the state water planning process. To initiate integrated water resources planning and management in Pennsylvania, the Commonwealth should:

1) Develop and evaluate a framework and incentives for integrated water resources planning and management -- DEP, with assistance from other state agencies, compact basin commissions and local government representatives, should develop a framework that links water resources planning elements from the State Water Plan and programs such as Sewage Facilities Planning, Stormwater Management Planning, Source Water Protection Planning, the Watershed Restoration and Protection Program, Water Supply and Wastewater Planning, and Flood Control Planning. In conjunction with this technical guidance, DEP should craft a financial incentive package that encourages integrated water resources planning and implementation. Initially, the incentive bank could be capitalized from various DEP financial assistance programs, DCNR's Rivers Conservation Fund, and DCED's Land Use Technical Assistance Fund. This approach enables counties to develop integrated water resources plans and provide planning consultation services to the municipalities in their jurisdiction. Municipalities would adopt the county/multi-county plan and develop ordinances that are consistent with the plan.

2) Implement trial integrated water resources plans using the Stormwater Management Planning program (Act 167) in cooperation with willing counties/multi-county areas -- DEP should work with willing local government officials and citizens to undertake integrated water resources planning in a variety of settings. The trial plans should be developed and implemented within the existing regulatory structure. Based on the outcome of these evaluations, the above-referenced framework may be revised or further enhanced for more a more efficient planning process, and proposals to amend pertinent regulations, and to revise institutional organization or responsibilities governing all levels of water resources management should be made.

3) Provide services to assist county and local officials prepare and implement integrated water resources management plans -- Ongoing training should be conducted to educate county and municipal officials about the practical benefits and fiscal advantages of integrated water resources planning and management. DEP should provide flexible planning guidelines and model ordinances to assist county and local government officials develop and

implement integrated water resources plans that meet their specific needs. Model ordinances, guidance, standards, and criteria should be developed and recommended for use by municipalities to aid in implementing their plans and ordinances. Training that is tailored to municipal solicitors and engineers should also be presented. Non-government and professional organizations and associations should be prepared to offer counties and municipalities the assistance and guidance needed to adopt approaches that best suit their water resources objectives.

4) Provide sufficient resources to re-establish the multi-agency single point of contact (SPOC) for integrated water resource plans -- The multi-agency SPOC for integrated water resources plans should be coordinated by the Governor's Center for Local Government Services and include participation by the DEP, DCNR, PENNVEST, PennDOT, PEMA, and PUC to prioritize integrated water resource planning and implementation. The decisions of these agencies must be consistent with the State Water Plan.

5) Review current policies and identify potential roadblocks to integrated water resources management -- During and after the development of the trial integrated water resources plan for selected counties, a third party should assist DEP and the Statewide Water Resources Committee in identifying roadblocks to successful integrated water resources management plan implementation, as well as legislative changes and possible amendments that would encourage more effective and efficient water resources integration. This analysis and the recommendations that flow from the trial projects will be highlighted and implemented as appropriate. The recommendations will reviewed and updated as part of the 2013 State Water Plan.

Discussion

For over a decade Pennsylvania has administered its water resources management programs on a watershed scale by encouraging local leadership and community action through financial and technical assistance. The next generation of water resources management must continue to build on these accomplishments to maintain energy and momentum. Successful water resources planning and management now demand a more organized and integrated course that combines the assets of all levels of government, private sector interests, and citizen participation.

Integrated water resources management entails making common sense decisions while considering water quantity and water quality needs. To chart a seamless and transparent course toward this goal, three strategic areas must be addressed:

- blending the components and processes of water resources management within DEP

- improving coordination across state agencies and throughout the federal, interstate, state and local government hierarchy, and

- solidifying the connection between land use and water resource management.

WATER CONSERVATION AND EFFICIENCY IN PENNSYLVANIA

Recommendations

1) The Water Resources Technical Assistance Center (Center) should be established that satisfies the requirements set forth in Section 3120 of the Water Resources Planning Act.

2) Support and enhance the Susquehanna River Basin Commission's (SRBC) efforts to develop a plan of action for implementing the Center by:

    a) Producing a preliminary mission statement for the Center.
    b) Determining where the Center will be housed.
    c) Identifying potential partners who would establish, maintain and operate the Center.
    d) Outlining initial start-up funding requirements for the Center and investigate potential funding sources.

3) A program for managing water conservation is recommended based on the Arizona model. An academic institution should physically "house" and offer administrative support for the Center. Selection for this entity should be done through a request for proposal process. Oversight and functional responsibility should rest with a "board" whose membership would be comprised of representatives from the private sector, academia, and government (including DEP and state elected officials).

4) Once SRBC completes and presents its plan of action for the Center, it is recommended that DEP issue the RFP for maintaining and operating the Center.

5) A majority of the initial functions of the Center should be to achieve effective outreach and incentive building. Eventual expansion into research and development is a longer term goal for the Center.

6) The Center will require a substantial, consistent and dependable funding source. A legislative appropriation of $250,000 should be provided for the Center's initial incubation period. Future funding, in addition to legislative appropriations, would be obtained through grants from both the private and public sectors.

7) The following are additional recommendations and goals for improving water conservation and efficiency:

a) Conduct research and promote innovative practices through marketing incentives, outreach and educational efforts
b) Support innovation and implementation of technology and use policies that cut water resources use and demand at peak times of drought or resource constraint
c) Implement technology and use policies that result in reducing overall base demand.
d) Provide support and resources to entities that have implemented or started to implement innovative water conservation or water efficient practices
e) Promote greater use of local "Microgrids of water" (catchment and use of precipitation to supplement withdrawals from ground water or streams and rivers)
f) Establish funding rebates or swaps of industrial high water using equipment (open loop systems) with closed looped systems or low water use residential appliances
g) Employ “smart meters” that enable detailed measurement of water use in buildings to identify leaks and other wasteful water
h) Establish rate structures that encourage using water at times of less demand

Discussion

Promoting water conservation technologies is one of the three principle priorities of the State Water Plan. Pennsylvania should promote leadership and business development in innovative water resource conservation, water use efficiency, and water quality protection and enhancement technologies.

Water conservation and improved water use efficiency are generally voluntary initiatives, but they are also frequently presented in a regulatory context. The Water Resources Planning Act, the Water Rights Act, and regulations promulgated by the Pennsylvania Emergency Management Agency, the Public Utility Commission, the Delaware River Basin Commission and the Susquehanna River Basin Commission all have water conservation provisions.

DEP is a promotional partner for WaterSense®, a program sponsored by the U.S. Environmental Protection Agency, whose mission is to protect the future of the nation’s water supply by promoting and enhancing the market for water-efficient products, programs and practices. This “national brand” program, similar to the “Energy Star” program for energy efficiency, offers people an easy way to make product choices that use less water without sacrificing quality or product performance.

Water conservation will play a prominent role in the Water Resources Technical Assistance Center (Center) that is required by Section 3120(A) of the Water Resources Planning Act. The Center’s role will be to promote voluntary water conservation and provide technical assistance on water resource issues, including

practices and measures that reduce demand for water, improve water use efficiency, reduce water leakage and enhance groundwater recharge. Water conservation and efficiency measures such as these and others will be fully explored as the Center becomes functional.

WATER WITHDRAWAL AND USE MANAGEMENT IN PENNSYLVANIA

Recommendations

1) Water use registration and reporting regulations should be adopted and implemented as expeditiously as practicable, to facilitate the gathering of more accurate and timely water withdrawal and use information. DEP, in concert with stakeholder organizations, should engage in concerted outreach efforts to improve the understanding of, and compliance with, the registration and reporting program.

2) The next phase of the State Water Plan should include, among other items, increased attention upon the development of water use projections in each watershed for the next 20 years, and the evaluation of major water use trends.

3) As further information concerning Pennsylvania's water use trends and challenges are developed over the next five years leading up to the next update of the State Water Plan, concerted focus should be placed on considering and evaluating the options and issues, and evaluating programs that are used in other states, utilizing a process which includes the Department, the Statewide committee, and other major stakeholders. Based on that process, a report on the relative merits of the identified options should be developed, and appropriate recommendations should be made to the general assembly as to whether and how Pennsylvania's water rights system might be improved and made more efficient, effective, predicable and secure.

Discussion

Water resources law is fundamentally about the allocation of the use of the water resources among competing users. In Pennsylvania, the right to water is not a property right to which title can be acquired, but rather a "right of use" of the water resources. The water right is not written down anywhere and it cannot be severed or separately sold, like mineral or timber rights that may be held as separate estates in Pennsylvania. Water rights are defined by a combination of common law, state and federal statutory law, case law and institutional arrangements. The current common law system in Pennsylvania has been criticized by knowledgeable commentators as having several significant problems. There are a number of potential remedies that may merit review and evaluation. Each of these options has some advantages and potential disadvantages or questions, and much will depend upon the acceptability of each option to the key stakeholders.

In the context of reviewing options, consideration should be given to policies and appropriate approaches for managing withdrawals to conserve flows needed for instream and downstream uses, including fisheries and aquatic systems. Those

discussions should include a thorough review of the models, field experience and scientific data available concerning the relationship between flows, habitats and actual fish populations, and an examination of the impacts on sustainability and reliability of water supplies of various policy options relating to pass-by, conservation flows and the application of such policies to surface and groundwater withdrawals in various watersheds.

WATER QUALITY

Recommendations

1) In an effort to reduce sediment and nutrient loads for the improvement of Pennsylvania water quality, and to meet Chesapeake Bay Tributary Strategy goals, the Commonwealth should provide funding for –

   a) Increased loans, grants, or tax incentives for infrastructure improvements of sewage treatment facilities.

   b) Increased loans, grants, or tax incentives for agricultural Best Management Practices.

   c) Establish loans, grants, or tax incentives for infrastructure improvements and retrofitting of stormwater facilities.

2) The Commonwealth should enact legislation for the certification of well drillers and the establishment of private water well construction standards -- There are currently national testing and certification programs available that measure the proficiency of applicants for initial licensing or renewal. The National Groundwater Association, among others, has functional model programs already developed. Pennsylvania should draw upon this expertise to establish a proficiency-based licensing and renewal system for well drillers. Legislation or should be enacted to establish construction standards for water well drilling. These standards should include:

   a) Well Siting/Location – Wells need to be protected from potential contamination sources and provide appropriate distances from known points of contamination.

   b) Construction – Specifications should be established for grouting, casings, and screening materials in order to preclude the entrance of contaminants.

   c) Reporting – Requirement for post-drilling reports regarding quality and quantity measurements should be provided to the landowner and the appropriate regulatory agencies.

3) The Commonwealth should continue funding for Acid Mine Discharge (AMD) restoration – Pennsylvania has made great progress in the treatment of AMD by DEP partnering with local municipalities and watershed organizations. The continuation of that progress should be encouraged through the establishment of a dedicated funding source to implement and maintain AMD treatment facilities.

4) Local government land use planning decisions should consider the impacts on water as a resource--

   a) Land use planning and zoning ordinances should consider the impacts of land use, development, and redevelopment on water quantity and quality.

   b) The protection of our water resources must be considered early in the development planning process in order to address cumulative impacts to a watershed.

   c) The alterations to the landscape must also consider stormwater management. It is important that stormwater be considered as a resource, and be managed for re-use and recharge of the groundwater.

   d) Protect, maintain, and restore functions and values of sensitive areas during development and redevelopment. Sensitive areas within the watershed, such as wetlands, well heads, headwaters, and riparian zones should be protected from the impacts of future development.

   e) The last defense to protect water quality is the land immediately adjacent to rivers and streams. To the maximum extent practicable and cost effective, vegetated buffers should be preserved and restored along all waterways.

5) DEP along with other appropriate Commonwealth agencies should develop guidelines and tools for groundwater assessment – Guidelines should be developed for assessing and minimizing cumulative hydrologic impacts in a watershed resulting from any activities on the land. A tool, similar to the Water Budget Screening Tool, should be developed to assess the quality and quantity of groundwater and identify areas of impairment.

Discussion

Water quality is influenced by both natural and anthropogenic conditions. The quality of surface water and ground water is vital to the health and quality of life for every Pennsylvanian and crucial to sustaining our indigenous water dependent biological communities.

Pennsylvania has over 86,000 miles of streams, more than 16,200 miles of those streams are impaired due to sedimentation, metals, and nutrients. There are numerous sources that contribute to these causes including, agriculture, mining, wastewater treatment plants, development, and urban runoff. A factor that is often overlooked is how a change in the quantity of ground or surface water can affect water quality. An integrated approach to comprehensive water use planning will account for all the users and dischargers in a watershed, provide for the proper siting of those users, protect sensitive areas, and provide long term assurance that

both water quantity and quality will be maintained for future generations. Human activities that disturb the surface of the land have an impact on water quality; the goal is to conduct those activities in such a way that the impacts to the land surface and the potential impacts on water quality are minimized to the greatest extent possible.

The protection of sensitive areas such as, well heads, headwaters, wetlands, river and stream corridors and flood plains contribute to the improvement of both water quantity and quality. Over three million Pennsylvanians rely on ground water obtained from public or private wells. While public water supply wells are required to meet strict construction standards, private residential water well construction is largely unregulated and no minimum statewide construction standards are in place. Pennsylvania is one of only two states that do not have statewide standards regulating private water well construction. Properly sited and constructed water wells are reliable and safe sources of drinking water, and prevent ground and surface water contamination.

The continued development of land in headwater regions alters the landscape, influencing changes in stream flow and water quality. Water quality may be altered by quantity changes, and also by the introduction of pollutants in stormwater runoff and from other human activities that previously did not occur in the area. The corridors directly along streams and rivers, known as riparian zones, are vital to maintaining water quality. When managed properly riparian zones act as buffers to slow runoff to the stream, filter pollutants, and provide vegetation to stabilize stream banks. These corridors also act as floodplains to provide storage for excess water during flood events. Riparian zones are critical to providing habitat for Pennsylvania's wildlife and aquatic communities.

There is an astounding diversity of aquatic life in Pennsylvania's streams and lakes that depend directly on an adequate amount of stream flow and appropriate habitat. Balancing water as a resource to meet sustainable consumptive uses while supporting Pennsylvania's diverse biological communities needs to be a basic tenet in integrated water resource planning.

ASSESSMENT OF NAVIGATION NEEDS AND THE MEANS FOR RESTORATION, DEVELOPMENT AND IMPROVEMENT OF TRANSPORTATION BY WATER

Recommendations

1) Hydrology and channel configuration create the fundamental conditions for navigation in Pennsylvania's waters. Where appropriate, the Commonwealth should build on prior efforts related to infrastructure construction, shipping channel maintenance, security, adequate flow management and water quality protection to support commercial and recreational navigation. Also crucial are related mapping and dredging activities to allow safe passage. The Commonwealth should work closely with the United States Army Corps of Engineers and other operators of dams and impoundments to maximize the benefits of multiple use management. The Commonwealth should support bathymetric mapping of waterways used for navigation, currently being conducted by the U.S. Geological Survey and the Department of Conservation and Natural Resources.

2) Safe and effective management of dredged material is important to navigation on our rivers and lakes. The Commonwealth, and other resource regulators and operators, should manage dredging and dredged material for multiple purposes such as enhanced navigation, beneficial uses, protection of watercourses, and wetlands and beach formation.

3) The Commonwealth should advance and encourage the efforts of PennPorts in the Department of Community and Economic Development, with the support of several federal agencies, to expand its efforts through regional port authorities to develop strategic plans for supporting and managing commercial navigation in Pennsylvania. The Commonwealth should continue to promote the competitive position of the Ports of Philadelphia, Pittsburgh, Bucks County, and Erie.

4) The Commonwealth should continue to address navigation-related water quality and quantity issues such as ballast water management, wastewater and trash disposal from commercial and recreational vessels, monitoring systems, emergency response and security management.

5) The Commonwealth should continue to manage public natural resources in the beds of navigable waterways, subject to the permitting and submerged lands license or legislative lease process provided under the Dam Safety and Encroachments Act, as well as the requirements of the Fish and Boat Code.

6) The Commonwealth should continuously evaluate infrastructure needs for

locks and dams, reservoirs, and intermodal transportation facilities. Where appropriate, the Pennsylvania Fish and Boat Commission should continue to fund or endorse dam removals where the dams no longer serve a useful purpose, thereby improving migratory fish passage and eliminating obstructions to recreational navigation. The Commonwealth should periodically re-examine its institutional arrangements for evaluating infrastructure needs and their adequacy for achieving the Commonwealth's goals.

7) The Commonwealth should continue to participate in regional institutional efforts to manage water quantities, flows, and flooding, which all affect navigation. Institutional arrangements and agencies that support Pennsylvania's navigation interests such as the Great Lakes Water Management Agreements, the interstate river basin compact commissions, and the International Joint Commission should be continued and encouraged.

8) Where appropriate, the Pennsylvania Fish and Boat Commission and other agencies should continue to fund or permit boat launches and other on-shore and in-water facilities that enhance recreational boating. Recreational boating should be facilitated in locations where it will not unduly interfere with water dependent biological communities, commercial navigation in areas with federal navigation channels or other more appropriate human uses. Diverse considerations may apply for different types of watercraft.

9) In implementing each of these recommendations, the Commonwealth should continue to protect both the public rights in public trust resources and private rights in private property.

Discussion

Pennsylvania's commercial and recreational navigation assets provide significant economic benefit to the Commonwealth. Navigational commerce offers direct employment, and supports thriving businesses that depend on the availability of commercial ports and accessible waterways. Commercial port activities on the Delaware Estuary, Lake Erie, and on the Allegheny, Monongahela and Ohio Rivers are vital to the economy of those regions. Many Pennsylvanians and visitors to the Commonwealth also enjoy sailing, pleasure boating, fishing and other water sports that further contribute to the economic strength and the quality of life in Pennsylvania.

The Commonwealth has a legal obligation to preserve public rights in submerged lands of the Commonwealth and navigation. Pennsylvania's water resource management decisions should support both commercial and recreational navigation opportunities but must also carefully consider public trust responsibilities, as well as economic benefit, the needs of water dependent uses, wetland and aquatic resources preservation, and private property rights.

The potential infrastructure needs and environmental consequences of commercial and recreational navigation differ by region in the Commonwealth. Vessel types capable of operating globally and using regional infrastructure vary broadly, as do sanitation needs for marine or fresh water environments. In addition, flow management, flooding, and water quantity protection and monitoring strategies are not regionally or internationally consistent.

Commercial shipping, international trade and maintenance of federal navigation channels and recreational boating harbors raise multifaceted management issues related to aquatic habitats and dredged material disposal. Alterations of navigable waterways and non-navigation related uses of submerged lands provoke questions about public benefits and equitable compensation.

AN ASSESSMENT OF FLOODPLAIN AND STORMWATER MANAGEMENT PROBLEMS

Recommendations

Flood Control Recommendations

1) Review and update elements of the Pennsylvania Enhanced All-Hazard Mitigation Plan that address flooding. Revising the flood loss reduction and flood mitigation portions of the plan would provide updated guidance for federal, interstate, state, and local agency activities in the Commonwealth. To begin this effort, the Delaware River Basin Commission Interstate Flood Mitigation Task Force Report (July 2007) should be evaluated and relevant provisions should be considered for statewide application. In conjunction with this initiative, stormwater management plans developed under the Storm Water Management Act should be expanded to support local flood mitigation projects and include specific recommendations for reducing flood events.

2) Invest in an enhanced Flood Forecasting and Warning Systems for all major river basins, utilizing a partnership of federal, state, and local government.

3) Support FEMA efforts to update Flood Insurance Rate Maps.

4) Amend the Flood Control Act to provide DEP with general authority to indemnify federal agencies for water resources projects.

5) Increase efforts to protect the floodplain and enhance community recovery assistance following a flooding event.

    a) Evaluate Section 301(a) of the Flood Plain Management Act to consider expanding the list of floodplain obstructions that have been determined to present a special hazard to public health and safety, may cause significant pollution, or may endanger life and property.

    b) Amend the Flood Control Act to provide authority to consider and implement all potential flood control solutions, including non-structural alternatives and preventative approaches to reduce the risk of flooding; and allow all types of flood control solutions to be funded through the capital budget process.

    c) Review and evaluate the Federal Flood Insurance Program to identify policies, such as the buy out option, which can be enhanced to decrease the amount of damage to communities.

d) Prioritize flood recovery funds for activities that protect the flood carrying capacity of the floodplain. Invest funds as effectively and reasonably as possible to restore the floodplain and to prevent future losses.

e) Revise existing post-flood recovery funding programs to require post-disaster assessments and mitigation investigations, and to emphasize increased efforts on floodplain restoration, and restoration of flood carrying capacity.

f) Ensure that state funding programs offer a preference for locating or relocating structures outside of the floodplain. Where this approach is not feasible, approval to build or rebuild within the floodplain should include provisions for restoration and remediation of the floodplain to minimize future flood losses.

g) Ensure that existing programs are coordinated and provide incentives for floodplain protection and restoration. Public funds used for flood recovery and rebuilding should target floodplain and carrying capacity restoration, and obstruction removal. Retrofitting existing development with facilities designed to minimize flood losses should be considered where appropriate.

6) Appoint a Commonwealth Flood Coordinator charged with coordinating flood prevention and recovery activities among state agencies. The Commonwealth Flood Coordinator would also serve as the primary point of contact for federal, interstate and local officials on flood-related matters.

7) Working through the Department of Community and Economic Development, establish an information center/clearinghouse to provide education and training to local government officials, municipal solicitors, municipal engineers, and the design community that emphasizes the importance of embedding integrated stormwater and floodplain management considerations into every municipal decision.

<u>Stormwater Management Recommendations:</u>

1) Through appropriate legislation, regulation, and administrative changes, integrate and leverage existing state and federal stormwater management regulations, policies and requirements (e.g. Storm Water Management Act, Sewage Facilities Act, Municipalities Planning Code, Chapters 102 and 105, NPDES, MS4, TMDLs) to provide an effective, straightforward, seamless stormwater management program that is blind to regulatory origin.

2) Establish an information center/clearinghouse (such as the Water Resources Technical Assistance Center authorized by Section 3120(A) of the Water Resources Planning Act) to deliver education and training to local government officials, municipal solicitors, municipal engineers, and engineering and design

professionals involved in land development to advance the understanding and utilization of effective stormwater management practices and regulatory requirements, and to emphasize the importance of integrating stormwater and floodplain management considerations into all municipal decisions.

3) Clearly authorize by legislation, regulation, or policy the creation and operation of local Authorities, Utilities or Management Districts, and/or other sustainable funding sources that enable entities to collect fees and generate revenues dedicated to planning, constructing, monitoring, maintaining, improving, expanding, operating, inspecting and repairing public and private stormwater management infrastructure.

4) Through appropriate legislation, regulation, and administrative changes amend and update the stormwater management program to:

    a) Manage the level of effort allotted for preparing and updating stormwater management plans. Target critical watersheds with serious quality or quantity problems, based on a set of criteria (e.g. % impervious cover, population density, federal requirements, special protection watersheds, impaired waters, rate of development, chronic flooding history, Critical Water Planning Area designation), for detailed planning efforts. Remaining areas could be covered using a standard planning outline.

    b) Allow added flexibility to determine appropriate watershed-related planning units.

    c) Use stormwater management planning as a tool to achieve compliance with the TMDL implementation where a water body is impaired by stormwater, and a TMDL has been prepared or adopted.

    d) Improve enforcement provisions to provide meaningful economic incentives to adopt, amend and implement stormwater management plans and ordinances.

    e) Include provisions to address long term operation and maintenance of stormwater management facilities.

5) Adequately fund regular updates to the Pennsylvania Stormwater Best Management Practices Manual to reflect innovation and change, and continue to maintain and update the Stormwater Management Model Ordinance to reflect Manual revisions and statutory amendments.

6) To the maximum extent practicable and cost effective, vegetated buffers should be preserved and restored along all waterways.

7) Through legislative, regulatory and administrative provisions, seek to manage stormwater so as to reduce excess runoff and pollutants.

8) Fund, promote and encourage water resource restoration projects.

Discussion

Preventing loss of life and reducing property damage due to flooding are among the Commonwealth's chief priorities. These priorities have stimulated a renewed emphasis on ensuring the safety of high hazard dams, and expanding floodplain management and flood control efforts. Existing flood mitigation efforts can be enhanced by establishing floodplain management programs on a watershed basis that integrate stormwater management planning and water quality protection. Integrated stormwater and floodplain management techniques that draw on a broad spectrum of management practices, legal requirements, and structural options will accelerate the restoration of natural floodplains and their flood carrying capabilities. Even the best flood control arsenal, however, will sometimes be overwhelmed. When it is, emergency response and recovery programs must stand ready to provide both immediate services and enduring remedies to affected communities.

A vigorous stormwater management program strengthens flood control efforts and supports flood protection priorities. Enhanced stormwater management planning demands expanded data collection and upgraded computer models to simulate stormwater runoff. Employing natural land features to restore and sustain the hydrologic balance of surface and ground water to prevent potential water quality and quantity degradation is essential. Once in place, assurance of continued operation and maintenance of stormwater control facilities and best management practices (BMPs) becomes critical to continued success.

Local government plays a dominant role in both floodplain and stormwater management. All municipalities that have been identified by the Federal Emergency Management Agency (FEMA) as being subject to flooding must adopt such floodplain management ordinances as are necessary to comply with the National Flood Insurance Program. Local floodplain management plans, in conjunction with stormwater management plans that provide for sound land use and development practices, could prevent or reduce future damage and substantially alleviate existing problems in flood prone areas. Local governing bodies also sponsor and financially participate in flood control projects. Priority must be placed on engaging all levels of government as partners in resolving stormwater and flooding problems.

In addition, significant progress can be made by fostering, testing and employing innovative technology to advance stormwater management and flood control techniques beyond current capacities. Incentives for pursuing sustainable

development practices are equally important, particularly in areas of rapid growth and in densely populated neighborhoods.

Many historic problems can be remedied and future problems can be minimized through a combination of sound planning, properly constructed and maintained infrastructure, and appropriate management practices. By recognizing stormwater runoff as a valuable and reusable resource rather than as a waste that must be quickly moved away, a host of opportunities are opened to promote environmental protection and enhancement while saving money and complementing new growth and development.

Ideally, approaches to stormwater runoff management and flood protection projects should be integrated, mutually supportive and be guided by two fundamental principles:

- Avoiding, minimizing and addressing problems through integrated approaches to comprehensive planning and progressive development practices, and

- Mitigating any remaining problems through the use of various structural and non-structural management techniques.

These principles are straightforward, and setting goals and priorities that are consistent with them is a routine task. Translating the goals into action, however, can present major challenges.

WATER SUPPLY ALTERNATIVES AND ASSESSMENTS

Discussion

The Water Resources Planning Act requires that this State Water Plan include **"**an identification and assessment of practical alternatives for an adequate supply of water to satisfy existing and future reasonable and beneficial uses, including improved storage, groundwater recharge and surface/groundwater conjunctive management programs." The Act further requires "an assessment of both structural and nonstructural alternatives to address identified water availability problems, adverse impacts on water uses or conflicts between water users, including potential action to develop additional sources or alternative supplies, conservation measures, and management techniques".

When choosing any remedy to a defined problem, water resource protection should play a central role in the selection process and options having a reduced potential for altering the environment should be given primary consideration. The identified alternatives ranged from straightforward and inexpensive management techniques to costly and highly invasive construction projects. Detailed descriptions and assessments of the various alternatives are included in the full text of this State Water Plan. The options that were evaluated are listed below:

- Employ Consumer Conservation Measures
- Public Water System Metering
- Apply Appropriate Pricing Strategies
- Water Loss Control
- Revise Operational Protocols
- Employ Conjunctive Management Techniques
- Restore Watershed Integrity
- Replace Potable Water Use
- Mitigate Consumptive Water Use
- Expand Treated Water Storage
- Regionalize Water Systems
- Recharge Groundwater
- Expand Treatment Capacity
- Increase Withdrawals from Existing Sources
- Increase Raw Water Storage
- Develop Additional Sources

These alternatives are not exhaustive nor are they exclusive. They are intended to provide only general direction and do not represent State Water Plan recommendations.

CRITICAL WATER PLANNING AREAS

The Critical Water Planning Area Designation Process

The Water Resources Planning Act established a process to designate "Critical Water Planning Areas" (CWPAs). CWPAs are areas of the Commonwealth where existing or future demands exceed or threaten to exceed the safe yield of available water resources. The Act also outlined a process for identifying CWPAs and provided the authority to prepare "Critical Area Resource Plans" (CARP) for any watershed or watersheds within a CWPA. A CARP must identify practical alternatives for assuring an adequate supply of water to satisfy existing and future reasonable and beneficial uses. DEP issued the "Guidelines for Identification of Critical Water Planning Areas (Guidelines)" on September 30, 2006. The Guidelines supply necessary detail on the statutory basis, the criteria and process for identifying CWPAs; and describe a five-stage process for nominating, reviewing, recommending and designating CWPAs.

CWPA Designation Stage 1: Nominations

Under the Guidelines, CWPAs may be identified through the planning process as a regional plan component or in advance of formal adoption of a regional plan based on information revealed during the planning process. Potential CWPAs may be nominated by a regional committee, a committee member, or any other person or entity, or initiated by DEP. As August 2008, two nominations have been presented to DEP: 1) York and Adams Counties submitted a nomination for a portion of both the Conewago Creek and South Branch Codorus Creek watersheds, and 2) The Chestnut Ridge Chapter of Trout Unlimited submitted a nomination for the Laurel Hill Creek watershed in Somerset County. Both nominations met the completeness requirements of the Guidelines and were distributed to their respective regional committees.

Thirty other watersheds identified by an initial statewide screening effort are going through a data verification process to confirm potential regional committee-generated nominations. Data for the two submitted nominations are also being checked. Upon completion of this verification work, DEP will review the results with the regional committees to recommend which of the 32 watersheds should be supported nominations and moved to the Statewide Water Resources Committee as CWPA candidates for designation by DEP.

CWPA Designation Stage 2: Screening for the Identification of CWPAs

Pilot Projects

During the late summer of 2006, the Water Analysis Screening Tool (WAST), a GIS-based model developed by the USGS for DEP, was tested on two pilot watersheds by comparing it against the initial screening criteria specified within the Guidelines. The results of the pilot projects, including data checks and corrections performed as part of the analyses, were used to launch a statewide CWPA screening effort required by the Act.

While working on the pilot projects, it became apparent that having accurate and complete water withdrawal, discharge and locational data was crucial. Two levels of critical data checks and corrections were identified as being necessary prior to conducting a statewide screening with WAST. At this broad level, errors that could be more easily identified within large tables of data would need to be corrected. On an individual watershed scale, more complete and locally unique data would need to be identified, and verified or corrected. A total of 24 watersheds were assessed in the testing phase. The testing focused on defining procedures and determining levels of effort necessary for checking and correcting data, and on preliminary WAST results.

During the fall of 2007, DEP ran the WAST statewide. This process screened out 90% of the state and focused attention on the remaining 10% for further data verification and evaluation of mitigation effects.

CWPA Designation Stage 3: Data Verification, Development and Review

Criteria established by the regional committees were applied in reviewing the results of the state-wide screening to establish a shortlist of 32 watersheds for which DEP and its technical partners would conduct a yet higher level of data verification and analyze potential mitigating factors. Among the 32 watersheds selected for verification were the two watersheds that were submitted to DEP in 2007 in accordance with the Guidelines as nominations for CWPA outside the statewide screening and verification process. The selected watersheds are presented on the following page.

Selected Watershed	Planning Region	Watershed Area (sq. mi.)
Brodhead Creek	Delaware	144
Little Lehigh Creek		190
Neshaminy Creek		233
Macoby Creek		17
West Branch Brandywine Creek		135
Hay Creek		22
Toby Creek	Upper	35
Spring/Nittany Creeks	Susquehanna	76
Anderson Creek		59
Sugar Creek		189
Little Catawissa Creek		17
Conestoga River	Lower	475
Chickies Creek	Susquehanna	126
Swatara Creek		572
Beaverdam Branch		87
Conewago Creek / S. Br. Codorus Cr.		581
Deer Creek		13
East Branch Antietam Creek	Potomac	52
Alloway Creek		16
Toms Creek		37
Rock Run / Marsh Creek		143
Conococheague Creek		494
Crooked Creek	Ohio	291
Indian Creek		125
North Branch Blacklick Creek		69
Connoquenessing Creek		333
Beaver Run		55
Laurel Hill Creek		125
Temple Creek	Great Lakes	15
Sixmile Creek		19
Elk Creek		98
Fourmile Creek		12

As of August 2008, work is underway to complete these watershed verifications.

CWPA Designation Stage 4: Review and Recommendations by Regional Committees:

After the verifications have been competed, regional committees will employ a review and decision making process, including public hearings, to recommend CWPA designations to the Statewide Committee. The findings will be summarized and recommendations will be made as to which watersheds, if any, meet the criteria for CWPA designation.

CWPA Designation Stage 5: Review and Designation by Statewide Committee and DEP

The final stage of the CWPA designation process involves the Statewide Water Resources Committee receiving individual regional committee recommendations, holding a Statewide Water Resources Committee Meeting to discuss the recommendations, and approving and forwarding recommendations to the DEP Secretary for concurrence and final designation decisions. The DEP Secretary will approve or reject recommendations, provide notifications of decisions, publish notice of the decisions in the *Pennsylvania Bulletin,* and post results to the DEP website.

Following designation of a CWPA, the Act states that a Critical Area Resource Plan (CARP) may be prepared for any watershed or watersheds within the designated CWPA. CARPs should address the key problem or problems identified during the CWPA designation process and identify practical solutions to the problems encountered. The relevant regional committee will establish a Critical Area Advisory Committee to guide DEP in developing each CARP. Once adopted, CARPs become a component of the State Water Plan, and may be implemented voluntarily.

DRINKING WATER AND WASTEWATER SUSTAINABLE INFRASTRUCTURE

Discussion

On February 27, 2008 Governor Edward G. Rendell issued an Executive Order creating the Sustainable Water Infrastructure Task Force. The task force was charged with issuing a report by October 1, 2008 that provides an analysis of the issues related to cost-effective and sustained investment in Pennsylvania's water and sewer infrastructure, including investigation of potential funding sources and financing options with the goal of including the recommendations in the Governor's fiscal year 2009-10 budget proposal.

In addition, the Executive Order calls for the Pennsylvania Infrastructure Investment Authority, the Department of Environmental Protection, and the Department of Community and Economic Development to review all existing policies, procedures, rules, regulations and program guidance governing the planning, permitting, operation and maintenance as well as provide any financial and compliance assistance related to Pennsylvania's water infrastructure.

With due process and at an appropriate time after issuance of the report and completion of the objectives outlined in the Executive Order, the Statewide Water Resources Committee may make specific recommendations related to ensuring the long term sustainability of the Commonwealth's water infrastructure.

GLOSSARY

Adequate supply – the quantity of water necessary to sustain reasonable and beneficial uses over the planning horizon.

Conjunctive Management Programs – programs that maximize water availability and minimize resource damage by balancing and optimizing the combined use of water supply sources, including ground and surface sources and interconnections.

Consumptive Use – the quantity of water discharged to the atmosphere or incorporated into a product.

Critical Area Resource Plan – a water resources management plan established for a Critical Water Planning Area that identifies practicable supply-side and demand-side alternatives for assuring an adequate supply of water to satisfy existing and future reasonable and beneficial uses.

Critical Water Planning Area – any significant hydrologic unit where existing or future demands exceed or threaten to exceed the safe yield of available water resources.

Future – A planning horizon that serves as the basis for evaluating water supply adequacy. Considering that the State Water Plan will be updated every five years, and considering the accuracy of projections beyond 15 years, a planning horizon of beyond 15 is likely to introduce substantial uncertainty into the evaluation and is therefore considered appropriate.

Groundwater – Water beneath the surface of the ground within a zone of saturation, whether or not flowing through known and definite channels or percolating through underground geologic formations, and regardless or whether the result of natural or artificial recharge, the term includes water contained in aquifers, artesian and nonartesian basins, underground watercourses and other bodies of water below the surface of the earth.

Net withdrawals –The total volumetric withdrawals from a watershed minus the total discharges.

Nonwithdrawal uses – The functions of or activities in water that is not withdrawn from a water resource, including, but not limited to, navigation, instream hydropower production, recreation, fish and wildlife habitat and the aquatic environment.

National Pollutant Discharge Elimination System (NPDES) – The national program for issuing, modifying, revoking and reissuing, terminating, monitoring, and

enforcing permits, and imposing and enforcing pretreatment requirements, under the federal Clean Water Act. Facilities subjected to NPDES permitting regulations include operations such as municipal wastewater treatment plants and industrial waste treatment facilities. NPDES permits in Pennsylvania are issued by the Department of Environmental Protection under a delegation agreement with the Environmental Protection Agency.

Reasonable and beneficial uses – The use of water for a useful and productive purpose, which is reasonable considering the rights of other users and consistent with the public interest, in a quantity and manner as is necessary for efficient utilization. The term includes withdrawal and nonwithdrawal uses.

Recharge – Addition of water to an aquifer by infiltration of precipitation through the soil, by seepage from streams other bodies of surface water, by flow of groundwater from another aquifer, or by pumping of water into an aquifer through recharge wells; also, the water added by these processes.

Safe Yield – The amount of water that can be withdrawn from a water resource over a period of time without impairing the long-term utility of a water resource such as dewatering of an aquifer; impairing the long-term water quality of a water resource; inducing a health threat; or causing irreparable or unmitigated impact upon reasonable and beneficial uses of the water resource. Safe yield of a particular water source is primarily to be determined based upon the predictable rate of natural and artificial replenishment of the water source over a reasonable period of time.

Surface Water – Water on the surface of the earth, including water in a perennial or intermittent watercourse, lake, reservoir, pond, spring, wetland, estuary, swamp or marsh, or diffused surface water, whether such body of water is natural or artificial. The term does not include recirculated process water or wastewater stored in an off-stream impoundment, pond, tank or other device unless such water or wastewater is withdrawn and used by a person other than the person who initially withdrew the water from a water resource or obtained such water from a public water supply agency.

Water conservation -- a beneficial reduction in water use or water waste/losses to wisely manage, preserve or save water.

Water use efficiency -- achieving the same result or accomplishing a function, task or process using less water or a minimal amount of water.

Water Resources Planning Act – the Act of December 16, 2002, P.L.. 1776, No. 220, §2; 27 PaCS §3101 *et seq* (2007)

Withdrawal uses – Any use of water that is withdrawn, including but not limited to, domestic, municipal, public, commercial, industrial, energy development and

production and agricultural water supply. The term includes the use of water transferred through interconnections but shall not include transfer of water within a system operated by the same public water supply agency.