

Building Strong Collaborative Relationships for a Sustainable Water Resources Future:

DELAWARE RIVER BASIN COMMISSION

SUMMARY OF REGIONAL WATER PLANNING

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The findings contained in this report are based on the information collected from the literature search and interviews for this initiative and should not be construed as an official Department of the Army position, policy or decision unless so designated by other official documentation.

DELAWARE RIVER BASIN COMMISSION

1. DESCRIPTION OF THE DELAWARE RIVER BASIN

The Delaware River forms in upstate New York and flows south, ending at the Delaware Bay in Delaware. The river is an important resource to a large population living within and outside of its watershed, including New York City. The following segment, excerpted from the DRBC's Water Resources Plan for the Delaware River Basin (Source: [2]), describes the basin and the multiple pressures on the resource that have necessitated the creation of the Delaware River Basin Commission to manage the watershed and develop a comprehensive water resource plan. Figure 1 shows a map of the basin and its location in the Eastern United States.

Physical Attributes

The river and its tributaries drain 13,539 square miles of varied landscape with distinct topography, soils, hydrology, natural habitat, development patterns, and economic interests.

This challenges the development of a Plan to address a variety of water resource issues through scale-appropriate resolution and implementation actions. Solutions need to be appropriate for local conditions as well as regional needs.

Political Fragmentation

The Delaware River is the political divide between New York, Pennsylvania, New Jersey and Delaware. The land within these four states is further subdivided into 42 counties, and 838 cities, towns, boroughs and townships. The multiplicity of governmental units is further compounded by a division of responsibility for water resource-related programs at the federal and state levels and a wide array of private organizations and individuals involved in water resource use, distribution, treatment and protection. Institutionalizing coordination and cooperation among these numerous entities may be the greatest challenge.

Multiple Pressures on the Resource

In all, nearly 15 million people, or roughly 5 percent of the U.S. population, rely on the ground and surface water resources of the Basin. New York City relies on the Delaware system for roughly half of its water supply and a lesser amount is exported for use in areas of New Jersey outside the Basin. That water supply source is a basin that covers only four tenths of a percent of the continental U.S. and includes some of the nation's most quickly developing counties. Three quarters of the non-tidal river — about 150 miles — is included in the National Wild and Scenic River System.

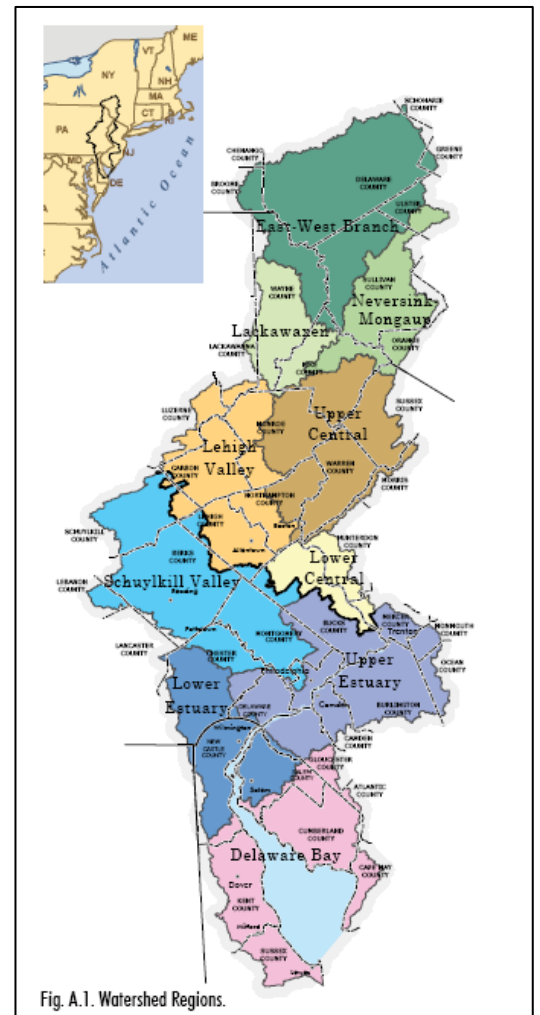


Fig. A.1. Watershed Regions.
Figure 1. Delaware River Basin Map,
Source [6]

Sustaining current uses, planning for future populations and economies, and protecting the landscapes critical for water resources depends on knowledge and the ability to educate current and succeeding generations to be resource stewards.

2. STATE/REGIONAL WATER PLANNING STATUS

The Delaware River Basin Commission (DRBC) was formed in 1961 when President Kennedy and the governors of Delaware, New Jersey, Pennsylvania and New York signed the Delaware River Basin Compact (hereafter referred to as the Compact), creating a “regional body with the force of law to oversee a unified approach to managing a river system without regard to political boundaries” (Source [1]). The Compact charges the DRBC with developing a “comprehensive plan for the immediate and long range development and use of the water resources of the basin” ((Source [3]), Article 13). This comprehensive plan includes information on specific development projects within the watershed that the Commission finds to be in the public interest and is periodically updated by the DRBC (4). The comprehensive plan satisfies Articles 13.1 and 13.2 of the Compact, however is not, for the purposes of this study, the document containing the water resources planning objectives that govern the overall management of the Delaware River watershed. In September 2004 the DRBC released the Water Resources Plan for the Delaware River Basin, the purpose of which is to “provide a unified framework for addressing and redressing new and historic water resource issues and problems in the Delaware River Basin” (Source [2]). The Water Resources Plan (hereafter referred to as the Plan) “sets a direction for policy and management decisions over the next 30 years and should be used as a guide for policy setting, decision-making and prioritizing actions originating from governmental units, private entities, organizations, and individuals” (Source [2]). The Water Resources Plan provides the guidance and framework for management and decision-making processes for the Delaware River Basin, while the Comprehensive Plan documents the ongoing projects and activities that are designed to carry out the Water Resources Plan.

3. RESPONSIBLE STATE AGENCIES/REGIONAL ENTITIES

The DRBC is the regional entity empowered to manage the Delaware River Basin– including water supply, pollution control, flood protection, watershed management, recreation, hydropower, regulation of withdrawals and diversions, intergovernmental relations, and capital financing.

The governors from the four basin states serve as commissioners, appointing a commission chair on a rotating basis. The federal government representative is appointed by the President of the United States.

The following list of DRBC staff identifies the points of contact for the Commission:

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4. WATER MANAGEMENT VISION AND GOALS

The DRBC has a published vision statement, available on their website, paraphrased as follows (Source [1]).

The Delaware River Basin Commission provides leadership in restoring the Delaware River and protecting water quality, resolving interstate water disputes without costly litigation, allocating and conserving water, managing river flow, and providing numerous other services to the signatory parties. In performing this leadership role, the Commission will serve as a policy-maker, regulator, planner, manager and mediator on behalf of the Signatories to the Delaware River Basin Compact and the citizens of the Basin.

We will:

- *Provide comprehensive watershed management.*
- *Act as stewards of the Basin's water resources particularly with respect to:*
 - *Surface water quality, including both point and nonpoint sources of pollution*
 - *Ground and surface water quantity, including water demands, water withdrawals, water allocations, water conservation, and protected areas*
 - *Drought management*
 - *In-stream flow management*
- *Promote effective inter-agency coordination to prevent duplication of efforts.*
- *Seek increased public involvement.*

By:

- *Serving primarily basin-wide and interstate interests; and national, statewide, regional, and local watershed interests as the need arises.*
- *Resolving interstate disputes through mediation.*
- *Regularly updating the Comprehensive Plan.*
- *Adopting and implementing policies to manage the Basin's water resources in an integrated, planned fashion.*
- *Integrating environmental and economic needs.*
- *Basing decisions on sound science.*
- *Providing meetings, conferences, seminars, and other opportunities for public education, information exchange, involvement, and resolution of issues.*

In addition to the Commission's official vision statement, there is also a specifically designed challenge and vision statement for the Water Resources Plan. The following excerpt from the Plan's vision statement lists the reasons for developing a comprehensive basin plan:

- *To establish a unifying vision for water resources management in the Basin.*
- *To identify a set of objectives and strategies for achieving goals and desired results.*
- *To better coordinate ongoing efforts to preserve, protect, and enhance the water resources of the Basin and the ecological, social and economic benefits they provide.*
- *To identify additional needs for more effective water resources management.*
- *To articulate roles and responsibilities.*
- *To recognize and account for all water resource uses in decision-making.*
- *To identify and consider the relationship between land use and water resources in decision-making.*
- *To invite all levels of stakeholders into the process of water resources management.*
- *To continue the successes and progress of the last 40 years through the next 30 years.*

5. SCOPE OF WATER RESOURCES PLANNING AND MANAGEMENT

The Water Resources Plan's foundation is a set of Guiding Principles, against which the policy changes and actions to implement the Plan should be judged. The Plan is organized into five Key Result Areas (Source [2]):

- Sustainable Use and Supply — *Managing both the quantity and quality of the Basin's waters for sustainable use*
- Waterways — *Managing the system of waterway corridors to reduce flood losses, improve recreational experiences, and to protect, conserve and restore riparian and aquatic ecosystems*

- Land and Water Resources Management — *Integrating water resource management considerations into land use planning and growth management while recognizing the social and economic needs of communities*
- Institutional Coordination and Cooperation — *Strengthening partnerships for the management of water resources among all levels of government, the private sector, and individuals sharing an interest in sustainable water resources management*
- Education and Stewardship — *Providing opportunities to enhance appreciation and commitment to the protection, improvement and restoration of the Basin's water resources*

Beneath each of the Key Result Areas, there are specifically defined Goals, Objectives, Milestones and Desired Outcomes. The Plan includes text describing each Key Result Area and associated Goals and Objectives while also providing an extensive Matrix of Goals and Objectives. There are several Goals within each Key Result Area and several Objectives for each Goal. Objectives are essentially smaller scale, more defined goals for which progress can be measured directly via the Milestones. The Matrix organizes the Goals and Objectives based on the numbered Key Result Areas listed above, giving a Milestone and Desired Outcome for each Goal/Objective combination.

An example of an entry in the Matrix of Goals and Objectives is given below (see Figure 2); the following explanations apply to the column headings of the matrix.

- **OBJECTIVES:** specific activities that aim to achieve the GOAL
- **MILESTONE:** sets deadlines to track progress
- **DESIRED OUTCOME:** the intended results of the GOAL/OBJECTIVE combination
- **SUPPORTS GOAL:** interrelated GOALS, often from other Key Result Areas

The measurable progress towards these Goals and Objectives is compiled annually in Basin Plan Progress Reports, which reports the percentage of DRBC staff time on each Key Result Area and the status of activities designed to satisfy the milestones defined in the Matrix.

DELAWARE RIVER BASIN COMMISSION

#	OBJECTIVES	MILESTONE	DESIRED OUTCOME	SUPPORTS GOAL
GOAL 3.5: Physically and visually emphasize and strengthen the social, historic, cultural, recreational and economic connections of communities to the Basin's waterways.				
3.5.A	Encourage waterside re-development, that emphasizes public access as well as aesthetic, historic, recreational, economic and cultural values	By 2006: Waterside redevelopment areas prioritized	Waterside properties are revitalized	2.2, 3.1, 3.5
		By 2008: Plan for infrastructure improvements as necessary	Public access, cultural, historic, recreational and educational design elements are emphasized for the community	
		By 2008: Public-private partnerships established for urban waterside redevelopment projects		
3.5.B	Create waterway transit opportunities for residents, commuters and visitors	By 2006: Assessments of transit opportunities	Increased use of waterway transit	3.5
		By 2008: Public and private investment in waterway transit modes		
GOAL 4.1: Improve coordination and cooperation in the management of water resources in the Basin.				
4.1.A	Achieve consistency in the implementation of water quality standards that apply to the shared waters of the Basin	Baseline 2005, 3 year reviews: Development of a common set of water quality criteria for shared waters	Maintenance of water quality to meet criteria	1.2, 1.3, 1.4, 4.1
4.1.B	Ensure at state boundaries that downstream state water quality standards are attained	Baseline 2005, 3 year reviews	Maintenance of water quality to meet criteria	
4.1.C	Achieve comparable monitoring, documentation and accurate reporting of data that involve the basin-wide water resources of the Basin	By 2006: QA/QC protocols and reporting methods are compatible for water resource assessment purposes		1.1, 1.2, 1.3, 1.4, 2.3, 4.1
4.1.D	Achieve consistency in protection of public health in regard to consuming fish and shellfish, due to chemical contamination, in regard to the shared waters of the Basin	By 2006: Share data and monitoring results • Consistent message to public for shared waters • Public awareness program is implemented		4.1
4.1.E	Achieve consistency in content and communication of advice for primary contact recreational use of shared waters	By 2006: System created for developing and communicating consistent advice regarding primary and secondary contact in shared waters to protect human health and safety	Advisories issued when necessary to protect human health (e.g., from bacteria) and safety (e.g., high flows and debris)	1.4, 4.1

Figure 2. Sample from the Matrix of Goals and Objectives (Source [2])

Sustainable Use and Supply

The Plan outlines an approach and objectives for ensuring an “adequate and reliable supply of suitable quality water to sustain human and ecological needs for the next 30 years” (Source [2]). The Plan advocates the use of integrated management to meet the objectives of this Key Result Area, considering that water quality and water quantity are interrelated; surface and ground water are inextricably linked; demand and supply must be balanced; environmental and social factors must be balanced with economic costs and benefits; and diverse legal and regulatory dimensions. The following goals define how the Plan proposes to ensure sustainable use and supply (Source [2]):

- 1.1 Equitably balance the multiple demands on the limited water resources of the Basin, while preserving and enhancing conditions in watersheds to maintain or achieve ecological integrity.*
- 1.2 Ensure an adequate supply of suitable quality water to restore, protect and enhance aquatic ecosystems and wildlife resources.*
- 1.3 Ensure an adequate and reliable supply of suitable quality water to satisfy public water supply and self-supplied domestic, commercial, industrial, agricultural, and power generation water needs.*
- 1.4 Ensure adequate and suitable quality stream flows for flow-dependent recreational activities.*

The Plan estimates water use, calls for a more detailed assessment considering the trends of all water users within the basin as well as exports from the basin to New York and New Jersey, and advocates the use of basin-wide water budgets to account for the availability of water within the Delaware River Basin. Other demands addressed by the plan are in-stream flow and freshwater flow requirements, predefined water rights, equitable balance during stressed conditions, and ecological integrity.

Water demand forecasting is defined in the plan, placing particular emphasis on alternative future predictions and showing how supply and demand will or will not balance depending on whether watershed development is managed or unmanaged. The Plan requires that a study of future water demands for the next 30 years be undertaken. The magnitude and spatial variation of future growth in the watershed should be considered, and the Plan objectives for ensuring future water supply to meet demand reflect the understanding of the differences between managed low-supply development and unmanaged high-supply development. The Plan recognizes the importance of water quality monitoring, maintenance, and improvement as an aspect of ensuring proper water supply for all uses.

Specific milestones are presented in the Matrix of Goals and Objectives that are designed to support the Key Result Area of Sustainable Use and Supply. The desired outcomes of these objectives and milestones include (Source [2]):

- *The use of tools in policy evaluation;*
- *Improvement of monitored biologic and hydrologic criteria;*
- *Minimize the environmental and other negative impacts of inter-basin transfers;*

- *Watersheds accommodate planned growth with minimal environmental impacts;*
- *Reduced environmental and economic severity of drought impacts;*
- *No measureable degradation of water quality;*
- *Improvement in metrics for wildlife health;*
- *Improvement in parameters of concern based on total maximum daily load schedules;*
- *No reported supply shortages under normal or drought conditions;*
- *Measurable and improved efficiency of water use;*
- *Increase in beneficial reuse;*
- *No salinity impacts to public and industrial users;*
- *Successful implementation of emergency response tools during a mock disaster drill;*
- *Workable, completed water supply contingency plans;*
- *Improved flows for water-based recreational activities.*

Waterway Corridor Management

The Plan outlines the desired result of “waterway corridors that function to minimize flood-induced loss of life, protect property and floodplain ecology, preserve natural stream and channel stability, provide recreational access, and support healthy aquatic and riparian ecosystems” (2). This Key Result Area includes strategies for managing flood plain development, recreational and cultural activities, and aquatic and riparian habitat. The following goals were developed for achieving comprehensive waterway corridor management (Source [2]):

- 2.1 Prevent or minimize flood-induced loss of life and property, and protect floodplain ecology.*
- 2.2 Enhance water-based recreation in the river and its tributaries.*
- 2.3 Protect, conserve and restore healthy and biologically diverse riparian and aquatic ecosystems.*

As part of improving flood management in the Delaware River Basin, the Plan proposes to assess flood hazards, develop pre- and post-development mitigation strategies, link flood control and stormwater management, take steps to minimize the ecological impacts of floods, enhance flood forecasting, and increase awareness of the natural functions of waterway corridors. In order to enhance water-based recreation within the Basin, the DRBC will create a Delaware Basin recreational use access plan, providing integrated management for recreation and tourism, protection for water resources from recreational impacts, enjoyment and convenient access, and protection for the health and safety of recreational users. The Plan also defines processes for incorporating ecosystem protection into flow management and water quality criteria, as well as controlling invasive species (Source [2]).

Specific milestones are presented in the Matrix of Goals and Objectives that are designed to support the Key Result Area of Waterway Corridor Management. The desired outcomes of these objectives and milestones include (Source [2]):

- *Online availability of flood warning and forecasting*
- *Compliance with disaster and mitigation act of 2000*
- *Removal of streams from impaired list (303(d)) for reasons of hydro-modification*
- *Develop basin-wide recreation plan, with regional segments*
- *Increased recreational use of waterway corridor amenities*
- *Continuous network of water trails along tributaries, connected to mainstream*
- *No unsafe conditions on rivers*
- *No flood damage due to debris*
- *Ongoing programs adequately staffed and funded*
- *Increase basin recreational advertisements*
- *Reduction in pollution inputs from recreational uses*
- *Increase recreational access and support for local and waterway corridor use and protection*
- *Locally optimal measures of habitat quality*
- *Targets met for key fish species*
- *20 percent increase in functioning wetland acres*
- *20 percent increase in habitat protection and restoration*
- *Basin-wide plans for invasive species management*
- *Basin-wide plans for sediment management*
- *Maximize stream miles without impediments to fish passage*
- *Increase in miles of stream with natural stability.*

Linking Land and Water Resource Management

The Plan recognizes this Key Result Area as “the integrated management of land and water resources to sustain the quality of life in the Basin; preserving, restoring and enhancing ecological resources while recognizing the community’s social and economic relationships to these resources” (Source [2]). This portion of the Plan presents an understanding of the watershed-based approach to managing land and water resources because of the inherent relationship between the two, as well as the need to consider the interconnection of land and water resources in decision-making. Two important necessities of watershed management planning are highlighted: (1) recognizing that water resources are cycled within a watershed; and (2) incorporating a watershed framework into our community, regional and statewide decision-making structures (Source [2]). The following goals were developed for linking land and water resource management (Source [2]):

- 3.1 Preserve and restore natural hydrologic cycles in the Basin’s watersheds.*
- 3.2 Maintain and restore the integrity and function of high value water resource landscapes.*
- 3.3 Fully integrate water resource considerations into land use planning and growth management.*
- 3.4 Encourage development and redevelopment in areas where growth can improve the economic viability of local communities while providing for the protection and enhancement of the water resources of the Basin; discourage development and redevelopment where it may impair water resources and their related natural resources.*

3.5 Physically and visually emphasize and strengthen the social, historic, cultural, recreational and economic connections of communities to the Basin's waterways.

The Plan proposes to achieve the above goals largely by incorporating watershed-based management into local community planning efforts. Preserving the natural landscape and flow regimes is also at the forefront of this management initiative, including preserving soil health and maximizing natural vegetation. The issue of impervious land cover and proper stormwater management is addressed, recognizing the roles that stormwater quality and quantity play in disrupting a river's natural function. Recognizing that certain landscapes within a watershed are integral to the quality and availability of water resources, the Plan calls for the proper maintenance of these areas and the full integration of water resource considerations into land use planning and growth management. The Plan encourages development within the watershed that balances the economic and social benefits with the protection and enhancement of water resources, suggesting that development can have a positive impact on the watershed if communities are aware of its potential impact.

Specific milestones are presented in the Matrix of Goals and Objectives that are designed to support the Key Result Area of Linking Land and Water Resource Management. The desired outcomes of these objectives and milestones include (Source [2]):

- *Surface waters are less impacted from storm events*
- *Stream base flows are maintained or restored with water quality improvements*
- *Targeted watersheds receive priority in water quality improvements*
- *Watershed communities adopt protection standards*
- *Functions of high values water resource landscapes are maintained*
- *Develop appropriate performance standards for local conditions*
- *Watershed communities preserve valuable water resource landscapes*
- *Surface water protection plans implemented*
- *Watershed assessments completed and water resource issues prioritized*
- *Growth management and land use planning approached on a watershed basis*
- *Multi-municipal plans adopted*
- *Watershed communities use available data and tools to assess alternative development scenarios with communities incorporation conservation design ordinances*
- *Plans and ordinances updated with water resource elements and watershed communities adopt ordinances*
- *Water resource issues are addressed through coordinated planning efforts with all water resource regulatory entities*
- *Redevelopment will be located in appropriate, targeted areas*
- *Encourage growth in areas with adequate infrastructure*
- *Discourage growth in inappropriate areas*
- *Safe and efficient waterways and ports*
- *Waterside properties are revitalized*
- *Public access, cultural, historic, recreational and educational design elements are emphasized for the community*

- *Increased use of waterway transit.*

Institutional Coordination and Cooperation

This Key Result Area advocates for “strong, institutionalized partnerships for the management of water resources among all levels of government, the private sector, non-governmental organizations, and individuals with an interest in sustainable water resources management” (Source [2]). The Plan emphasizes the need for coordination and cooperation among sectors making decisions regarding water resources, which is also an important aspect of integrated water planning and management. The differences between horizontal and vertical integration are discussed; horizontal integration being “the coordinating actions and programs among actors operating within a level of jurisdiction”, and vertical integration involving “the alignment of efforts at various decision-making levels to achieve consistent outcomes” (Source [2]). The following goals were developed for facilitating institutional coordination and cooperation:

- 4.1 Improve coordination and cooperation in the management of water resources in the Basin.*
- 4.2 Increase sharing of data, information, and ideas among Basin institutions, agencies and organizations, and reduce duplication.*
- 4.3 Secure adequate resources for programs and projects that encourage cooperative water resources planning and management.*
- 4.4 Use water resource partnerships to support and execute water resource management in accordance with the Guiding Principles, Goals and Objectives of the Basin Plan.*
- 4.5 Utilize the planning and regulatory powers of a regional governmental authority, the Delaware River Basin Commission, to facilitate coordination and cooperation.*

The Plan proposes to start by defining the key players whose efforts must be coordinated, then identifying the policies, laws and regulations that relate to water resource management, and finally creating a vehicle for which the players can collaborate with maximum efficiency to realize the ultimate goal: to effectively manage the Delaware River Basin. This collaboration includes sharing data, information and ideas as well as securing adequate resources to allow integrated management within and between agencies to occur. The DRBC is the facilitator and primary resource for bringing together the many agencies, organizations and other groups that will have a stake in the water resource decisions made in the basin, citing the responsibilities set forth by the Delaware River Basin Compact that require the DRBC to play this role.

Emerging challenges are discussed in this section of the plan, including climate change, invasive species management, and emerging water quality challenges. The Plan recognizes that these issues should be managed through cooperation of all agencies and stakeholders, to mitigate their negative impact on the watershed as a whole.

Specific milestones are presented in the Matrix of Goals and Objectives that are designed to support the Key Result Area of Institutional Coordination and Cooperation. The desired outcomes of these objectives and milestones include (Source [2]):

- *Maintenance of water quality to meet criteria developed for shared waters*
- *Advisories issued when necessary to protect human health (e.g., from bacteria) and safety (e.g., high flows and debris)*
- *Up-to-date web page on drought conditions and restrictions*
- *Drbc and states set consistent drought declaration and water use advice, states on record then will act independently as to criteria which trigger declarations and will issue their own water conservation initiatives*
- *Water resources information is easily accessible and current*
- *Single source of information for federal flood mitigation funding*
- *Increase number of internet hits and user surveys related to basin-wide database*
- *Benchmark and pilot efforts for ongoing management activities are tracked and available for review, to foster partnerships and reduce duplication of efforts*
- *Effective and efficient range of fusing sources that support water resource plans throughout the basin*
- *3 year assessments of implementation, include resource availability*
- *Integration of basin plan activities with federal and state program funding*
- *State of basin reports; tri-annual reporting on implementation progress*

Education and Involvement for Stewardship

The desired outcome of this Key Result Area is to achieve this statement: “The Basin community shares a collective understanding and appreciation of the Basin’s water resources and a commitment to their restoration, enhancement, and protection. This community values the water resources and understands the personal responsibilities needed to protect the resource” (Source [2]). The Plan recognizes the importance of public awareness and education as an aspect of watershed planning and management, emphasizing that, “a basic premise of water resource stewardship is to learn two things – that we live in a watershed and that we understand how to live within the limits of our water resource system” (Source [2]). The Plan further defines water resource education using four elements: (1) water resource awareness; (2) personal stewardship; (3) professional training; and (4) engagement (Source [2], [5]). The following goals were developed for education and involvement for stewardship (Source [2]):

- 5.1 Establish a Basin-wide sense of place.*
- 5.2 Increase student and youth awareness, understanding and active participation in water resources issues.*
- 5.3 Increase private sector awareness, understanding, and active participation in water resources issues.*
- 5.4 Increase local public officials’ awareness, understanding, and active participation in water resources issues, needs and management strategies.*

By increasing awareness of water resource issue and increasing opportunities for participation, the Plan emphasizes the need for a basin-wide sense of place which fosters the willingness to participate in local watershed activities and make “water-smart” lifestyle choices. The Plan proposes increased web-based and mass media resources and signage programs to help disseminate watershed information to the

public. Increased youth education and awareness of watershed issues is also included as a major part of increasing education and involvement for stewardship. Beyond individual stewardship, the Plan recommends private company involvement in watershed education and awareness initiatives. The Plan connects this Key Result Area to “Linking Land and Water Resources” through local public officials’ awareness and willingness to become advocates for watershed-based planning and management enacted at the community level.

Specific milestones are presented in the Matrix of Goals and Objectives that are designed to support the Key Result Area of Education and Involvement for Stewardship. The desired outcomes of these objectives and milestones include (Source [2]):

- *Increased participation in water resource programs and activities and increased coverage of water resource issues in the media*
- *More effective and efficient watershed planning efforts*
- *Increased requests from public about water resources and improved water quality*
- *Tracking system for basin volunteers and projects*
- *Diverse population participating at events, programs and decision-making*
- *Increased awareness of watershed boundaries*
- *Improved water quality from nonpoint sources and an increase in watershed activities*
- *All students in basin know their watershed address*
- *Students will know about water resources and land use*
- *Every school district has a watershed or stream project*
- *Increase hits on Ed-Web*
- *Private sector participation in water resource programs increased*
- *Improvement in local watershed; transferability to other watersheds*
- *Local ordinances protect water resources with watershed communities working together*
- *All levels of government work together to improve watershed management*
- *Watershed communities addressing shared concerns*
- *Additional dollars available for localities*

6. PARTNERSHIPS, STAKEHOLDER, AND PUBLIC INVOLVEMENT

As part of the agreement of the Compact, the DRBC is an official partnership between the four basin states and the federal government to handle the management of the Delaware River Basin. The DRBC operates under the guidance of several advisory committees made up of specialists from the public and private sectors. The advisory committees are grouped according to specialty: flood; information management; monitoring; regulated flow; toxics; water management; and water quality. The following list summarizes the committee membership (Source [1]); the complete list of advisory committee members is available on the DRBC website.

- *Academy of Natural Sciences*
- *County Water Resources Agencies*
- *State Government Agencies*
- *Regional Planning Commissions*
- *Academic Institutions*
- *Private Companies*
- *Public Utilities*
- *Federal Agencies and Administrations*

The Water Resources for the Delaware River Basin devotes a Key Result Area (see Scope of Water Resources Planning and Management) to public outreach and education: Education and Involvement for Stewardship. This portion of the Plan outlines the approach and objectives for public and community involvement in watershed planning. The Plan was also developed under the guidance of the Watershed Advisory Council and Basin Plan Advisory Committees. The following list summarizes the organizations that contributed to the Plan (Source [2]).

Watershed Advisory Council

- *Private Companies*
- *Environmental Groups*
- *County and Regional Water Authorities*
- *Municipalities*
- *Regional Planning Commissions*
- *Recreational Groups*
- *State Government Agencies*
- *Public Utilities*
- *Federal Agencies and Administrations*
- *Watershed Associations*

7. PLAN IMPLEMENTATION STRATEGY

In 1961 the Delaware River Basin Compact granted the DRBC authority as well as responsibility for the management of the Delaware River Basin, including water quality protection, water supply allocation, regulatory review (permitting), water conservation initiatives, watershed planning, drought management, flood loss reduction, and recreation (Source [1]). The DRBC defines its role in implementation as follows:

A principal role of the Commission is to coordinate policy and actions among the state and federal agencies involved with water resource protection and management within the river basin. The Commission's implementation of the Basin Plan occurs through modifications to its Comprehensive Water Resources Plan and the exercise of its planning and regulatory authority (Source [2]).

The DRBC strategy for implementing the Basin Plan is to recognize the responsibilities of each group of stakeholders, from the federal government level down to the individual community member level. The following summary lists the responsibilities of the various levels of stakeholders.

The federal agencies should supply data and information, provide funding to cooperative efforts among state and regional agencies, promote cooperation and communication among federal agencies, and eliminate redundancy in favor of a vertically integrated approach to decision-making and funding. State governments should be responsible for collecting and reporting data, supporting educational efforts, funding cooperative efforts among state and regional agencies and the private sector, enable and support planning and management efforts on a watershed basis, and coordinate efforts among state agencies. Regional governments (counties, commissions, councils, districts, etc.) should coordinate with states and other regional entities, collect and report data, and provide leadership and support for watershed-based planning and management. Responsibilities at the municipal level should include using data and information for better decision-making in communities and watersheds, collecting and reporting data, leading and supporting managed development within the watershed, include water resource considerations in local and multi-municipal planning efforts, exercise vested authority to incorporate resource protection into local planning, and work with down-stream and up-stream neighbors to improve the management of critical aspects of water resource management. The private and non-profit sectors include companies and other organizations with an interest in the water resources of the Basin, and they should work to establish partnerships at various levels to improve water resource management and utilize those partnerships to identify, collect and report on indicators of progress. The Plan assigns responsibility at the individual level, which includes leadership, education and participating in decision-making processes (Source [2]).

8. OUTCOMES ASSESSMENT PROCESS

The DRBC plans to measure its progress relative to baseline conditions in the watershed, established by existing programs and plans. After assessing baseline conditions, the DRBC will “monitor and report on those critical indicators when combined signal the improvement or deterioration of conditions in the Basin’s watersheds” (Source [2]). The Plan defines an indicator as an actual measurement of a condition, a measure of a pressure on the resource, or an outcome. The Plan recognizes that certain indicators should be measured on a basin-wide scale while others are more appropriately assessed at the sub-watershed and community level. The indicators are assembled into four categories: (1) Hydrology. (2) Water Quality; (3) Living Resources; (4) Landscape (Source [6]).

The State of the Basin Report, the first of which was released in December 2008, serves as a point of reference for gauging progress towards the goals of the 2004 Basin Plan. The last time the DRBC released a comprehensive assessment of the Basin was in the Level B Study in 1981. The State of the Basin Report is a comprehensive document that assesses baseline conditions for future progress to be measured against, and reports on data collected and the status of various indicators of watershed conditions. There is no mention of a set timeline for how often subsequent State of the Basin Reports shall be released.

9. NEEDS, CHALLENGES AND CRITICAL PRIORITIES - INTERVIEW INSIGHTS

The DRBC sees the future power sector demand as the biggest demand growth area in the basin. Also, just as some states are facing this issue, the DRBC recognizes that ecological flow needs pose a significant challenge in meeting the balance of water needs in the basin. The DRBC has identified flood mitigation (not structural control) and integrated water resources planning as two of its priorities at this time. In order to achieve its water resources goals and visions, the Commission needs multi-agency cooperation around common resource management strategies.

The DRBC is incorporating climate change into their integrated planning approach. It has partnered with NOAA/NWS and Universities to downscale global climate models and link with river basin hydrodynamic models to run alternative scenarios with multiple endpoints: drinking water; sea level rise, coastal damage reduction, water quality and living resources.

As with many states, funding is a challenge for the DRBC. The project-based funding of the USACE is seen as a hindrance to their participation in processes to develop tools and services alongside the DRBC. The Commission believes that the federal government has not provided enough funding for operating costs over the past 10 years. Additionally, state funding has been less than full share in the past few years due to the global economic slowdown. As a result of the funding problems, DRBC needs to focus on a smaller universe of priorities to align with their funding capacity.

The DRBC is an Interstate-Federal Compact Agency, making the federal government a direct participant in the management of the Delaware River Basin. It has collaborated with federal agencies on technical analyses, including data and modeling, specifically climate change modeling.

10. REFERENCES

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