Investing in the Future

By Jennifer Adkins, Executive Director, Partnership for the Delaware Estuary

Infrastructure: it’s not a very common word, but it’s been in the spotlight lately. In Delaware, the governor’s clean water initiative recently proposed new ways and needs for investing in the state’s water infrastructure — the system for insuring that Delawareans have safe, clean water. This system includes pipes and treatment plants; things we sometimes refer to as “gray infrastructure” or “built infrastructure.” It also includes trees and streams; things we sometimes refer to as “green infrastructure” or “natural infrastructure.”

When it comes to infrastructure for water, we’re twice blessed in our region. The Delaware River Watershed

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Credit: Melissa Bittner of the PDE

Jennifer Adkins (second from left), executive director of the Partnership for the Delaware Estuary, joins participants in the Wilmington and Camden green-jobs programs to search Brandywine Creek for freshwater mussels. They include Ezekiel Shockley (left), Jermar Ward (second from right), and Anthony Hawker (right). Freshwater mussels are considered a type of green infrastructure, because each one filters up to 20 gallons of water per day.
Investing in the Future

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(map on page 5) has uncommonly good natural infrastructure for water, including plentiful aquifers, forests, rivers, streams, and wetlands. We also have had the good fortune of generations before us who invested heavily in gray infrastructure like sewers and treatment plants. With all this infrastructure and millions of people and businesses in three states (four, including New York) that rely on it, managing the water resources of our region is no easy task. Just ask the Delaware River Master and the Delaware River Basin Commission (see pages 4-7).

But managing it is essential, and this is not possible without investment. In Pennsylvania, Philadelphia is investing in green infrastructure (like trees) to improve the way gray infrastructure (like sewers) operates. Since Superstorm Sandy, there is increased investment in New Jersey and around Delaware Bay on improving infrastructure for coastal resilience. Examples include repairing gray infrastructure like dikes and impoundments where they are crucial and using green infrastructure like restored shorelines with wetlands and shellfish where feasible.

From regional flow management, to community sewers (see pages 12-13), to backyard stormwater management (see pages 8-11), this issue of Estuary News highlights a variety of our region’s infrastructure needs. As our gray infrastructure ages and our natural infrastructure is increasingly stressed, investing in these systems is becoming more and more important. Both types of infrastructure are critical for clean water and a healthy Delaware Estuary. Investing in them today might seem costly, but it can save money in the long term, generate jobs and attract the residents and businesses that are the future of our region.

Infra—What?

Infrastructure includes the basic facilities, installations, and services needed for a community or society to function. Examples include bridges, electric lines, roads, sewers; the list goes on. People sometimes refer to these as “gray infrastructure” given their use of asphalt, concrete and the like. Green infrastructure uses plants, soils, and natural processes to help communities function in a healthier way. Examples include green roofs, rain gardens, riverside buffers, street trees and all-natural shorelines, just to name a few.

MEETINGS CONTACT LIST

Meetings conducted by the Partnership for the Delaware Estuary’s implementation and advisory committees occur on a regular basis and are open to the public. For meeting dates and times, please contact the individuals listed below:

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PDE to Honor Two at Philly Fundraiser

The Partnership for the Delaware Estuary’s staff and Board of Directors invite you to the Experience the Estuary Celebration on Thursday, October 9. The reception, dinner and auction will take place at the Independence Seaport Museum on Penn’s Landing in Philadelphia, overlooking the Delaware River. Please join us to honor Carol Collier and Bob Tudor, who recently retired from the Delaware River Basin Commission. The PDE will honor both with its Delaware Estuary Jonathan Sharp Lifetime Achievement Award. This award recognizes people for advancing science and management of the Delaware Estuary and River Basin. Visit DelawareEstuary.org for tickets, sponsorship opportunities, and how to make an auction donation, or call (800) 445-4935, extension 120.

Five New Faces at the PDE

The Partnership for the Delaware Estuary (PDE) welcomes three new employees and two new board members to its team this year.

Josh Moody became the PDE’s restoration coordinator following a one-year fellowship. Likewise, LeeAnn Haaf ended her 10-month internship by becoming the nonprofit’s first wetland specialist. Together they contribute to a nine-person team of scientists.

Melissa Bittner is now the PDE’s program specialist. She will work to teach and engage people throughout the Delaware Valley as part of a six-person team committed to education and outreach.

These new employees are joined by two new board members. They include Ann Faulds of Pennsylvania Sea Grant and Alison Kraus of PSEG.

Please extend a warm welcome to all these newcomers, and visit DelawareEstuary.org/Contact-Us for each employee’s bio.

Help Us Rally Supporters for the River and Bay

You can help the Partnership for the Delaware Estuary improve the tidal Delaware River and Bay by being a champion for its cause. We are seeking volunteers to help with a whole host of activities in Delaware, New Jersey and Pennsylvania.

If you enjoy meeting new people and seeing new places, then you might be just the person we need. We will even provide you with training, if necessary. Both short-term and long-term commitments are welcome.

Please visit DelawareEstuary.org to fill out a volunteer interest survey. The Partnership for the Delaware Estuary will use this to follow up with you.
The Delaware River has no reservoirs or dams on its main stem. Water flows freely and unimpeded from the confluence of the East and West Branches, where the Delaware River forms, all the way to the estuary. Approximately half of the river miles on the main stem are designated as part of the National Wild and Scenic Rivers System. Congress created this system to preserve certain rivers or sections of rivers in a free-flowing condition for present and future generations. Two sections of the river, totaling 113 miles, were designated as Wild and Scenic in 1978. Another 39 mile section was designated in 2000. The flow in the Delaware River is somewhat managed by flow management policies and dams, located in upstream tributaries within the basin. These dams and resulting reservoirs store water for different and multiple purposes such as flood damage reduction, water supply, recreation and power generation. Combined, these reservoirs control roughly 21% of the drainage area along tributaries above Trenton, New Jersey.

Reservoir releases are made to support ecological systems and reduce locally high in-stream temperatures. They are also made to maintain a constant reservoir elevation (normal pool), support recreation (white water), or create extra room for the capture of floodwaters. Depending on the purpose of the reservoir, additional releases may be made to achieve specific flow objectives or to support multiple goals. In some cases, reservoir operators use rainfall and runoff predictions to determine if there is extra water to release for beneficial uses. During dry periods, some reservoir operators have agreed to release water to maintain river flows. Doing so can relieve the impacts of droughts because water in addition to what nature can provide is now available for use.

During low flow periods, reservoir operators are typically required to make minimum conservation releases to ensure a specific amount of freshwater flows downstream and ultimately into the estuary. Assurance of freshwater inflows is achieved by releasing water to meet flow objectives at two specific locations. Trenton, New Jersey, at the head of tide, is one such location. The flow objective at Trenton ranges from 2,500 cubic feet per second (cfs) to 3,000 cfs, depending on reservoir storages, season, and salinity (saltiness) in the estuary. Prior to the establishment of the flow objective in the 1980s, the minimum recorded daily flow at Trenton was 1,240 cfs and occurred in October 1914 and in July 1965. By increasing freshwater flows in the river, the reservoirs and flow objectives have improved the basin’s drought resilience.

The other location with a flow objective is Montague, New Jersey. It ranges from 1,100 cfs to 1,750 cfs. Releases from three reservoirs, located in New York State, are used to meet the flow objective. Cannonsville Reservoir, located on the Delaware’s West Branch, is the reservoir that is typically used to do so. Reservoir operators may also make releases from Neversink and Pepacton Reservoirs. Releases from Lake Wallenpaupack and the Mongaup System are used to generate hydropower, which may reduce the amount of water that is needed to meet the flow objective from the other three reservoirs.

In Pennsylvania, there are five other reservoirs, which are operated by the U.S. Army Corps of Engineers (USACE), specifically constructed for flood damage reduction. Jadwin and Prompton are located in Northeast Pennsylvania and have what are known as uncontrolled outlets. This means...
Many reservoirs dot the Delaware River Valley, but officials use 11 to manage the river’s flow. These provide water to alleviate a drought. They also make room to store floodwaters. All told, they have the capacity to hold enough water to fill over 100,000 Olympic-sized swimming pools.

the outflow from the reservoirs cannot be adjusted. Much of the time, the inflows are immediately released downstream. During high flow events, water is stored because inflows to the reservoirs exceed the amount of water that can be released through their outlet works. The other three USACE reservoirs are F.E. Walter and Beltzville in the Lehigh River Valley and Blue Marsh in the Schuylkill River Valley (downstream from Trenton).

F.E. Walter is used for flood damage reduction and recreation (white water releases). Beltzville and Blue Marsh are used to increase freshwater flows into the estuary during dry periods and for water supply. During normal conditions when these reservoirs are full, releases are made to maintain the normal pool elevation. With the exception of refilling if below the normal pool elevation, releases will be nearly equal to the reservoirs’ inflow.

Some water within the basin is controlled by dams, reservoirs and flow management programs. However, there is little control of the streamflow coming from much of the Delaware River’s drainage area. During low and high flow events, the reservoirs and flow management programs result in beneficial outcomes, particularly drought resiliency and flood damage reduction. The development of these reservoirs in tributary basins has allowed the Delaware River to remain the longest undammed river in the eastern United States.

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Did You Know?

Did you know that the U.S. Army Corp of Engineers once recommended three dams that were never built in the Lower Delaware River Basin? They included dams on the:

- Maiden Creek, upstream of Reading, Pennsylvania
- Christina River, near Christiana, Delaware
- White Clay Creek, in what is now Delaware’s White Clay Creek State Park

Lastly, Delaware officials once proposed a dam over 175 football fields long across the Lower Delaware River near New Castle, Delaware. According to Damming the Delaware: The Rise and Fall of Tocks Island Dam, by Richard C. Albert, “the purpose of the Salt Water Barrier was to keep salt water from intruding north of Wilmington, thus creating a freshwater lake between Wilmington, Delaware and Trenton.” The Senate Public Works Committee even authorized a study in 1958, but they found it to be uneconomical.
FISHERMEN HOLD RIVER GUIDES IN HIGH REGARD. ENVIRONMENTALS TURN TO RIVERKEEPERS TO GET ACTION. BUT “RIVER MASTER?” WE REACHED OUT TO DELAWARE RIVER MASTER, ROBERT MASON, JR. AND HIS DEPUTY, MARIE HYNES, TO GET A HANDLE ON THEIR UNIQUE PROFESSION. ROBERT MASON, JR. PROVIDED THE ANSWERS THAT FOLLOW, WITH THE EXCEPTION OF A FEW, AS NOTED.

Q: What does a river master do, and how long have you been doing it?
A: There have been five Delaware River Masters. Marie has been the deputy Delaware River master for a little over two years and I have been the acting river master for about 16 months. When the river is low, we determine the rates and timing of required releases from New York City reservoirs. We also facilitate ongoing discussions between the parties involved to improve reservoir management.

Q: Who created your job and why?
A: River Masters are generally creatures of the courts. They hold hearings, gather facts, and help the courts decide how to allocate water amongst competing users. In 1952, the U.S. Supreme Court appointed a special master to consider facts involved in litigation between New York City and the State of New York versus the States of New Jersey, Pennsylvania, and Delaware. They disagreed over the diversion and use of water from the Delaware River triggered by construction of the Cannonsville Reservoir in Delaware County, New York. This was the third of three water-supply reservoirs the city built in the basin.

Relying heavily on the master’s report, the court issued a decree in 1954 resolving the litigation, allocating river water, and establishing minimum river flows. The court provided for modifications as long as all parties involved unanimously agreed to the changes. The Court also established a “permanent” Office of the Delaware River Master (ODRM). It did this to ensure that reservoir operations and water diversions conformed to the decree and subsequent agreements. That office was entrusted to the U.S. Geological Survey (USGS).

Q: How do you balance the needs of big cities like New York and Philadelphia, river towns like Burlington and Chester, and bayshore villages like Bowers Beach and Fortescue?
A: The Delaware is an interstate stream. The decree allocates quantities of upper-basin water to New York City and New Jersey while requiring the maintenance of minimum downstream flows. Most of the rules governing the exact amount and timing of these flows, and the operation of New York City’s reservoirs, are all subject to discussion. We also update them periodically in documents, such as the “flexible flow management program.” Over the years the parties have worked to address new needs even as our understanding of the river and impacts of the reservoirs has evolved.

Q: What kind of budget is needed to pull this off?
A: The ODRM is funded by an annual budget of about $500,000 split among three states and New York City. This budget covers essential streamflow monitoring. It...
also covers staff time to design the reservoir releases needed to maintain required flows.

Q: What are the tools you use to carry out your job?
A: We rely on USGS streamgages; most importantly, the streamgages on the Delaware River at Montague and Trenton, New Jersey, plus various rainfall gages and weather reports. We apply several empirical models (really charts and tables tracking flow travel times and water losses) in order to scale and time reservoir releases. Beyond that, we reach out to various scientists and interest groups to inform our operations.

Q: What does a good day as river master look like?
A: On a good day there is enough water in the river to meet all needs without threat of a flood. Fortunately, most days are like that. But our job is to handle the extremes in flows each year and, particularly, during times of drought.

Q: What does a bad day as river master look like?
A: A bad day is when there is too little or too much water in the river. On those days someone or something on or in the river is hurting.

Q: What is the biggest challenge you’ve faced as river master?
A: In our case, progress is possible only when all of the parties involved can come together to support a common objective. There is an abundance of goodwill and a shared commitment to the river among the principals. However, each of them reports to different constituencies, many of whom have conflicting needs, even within a single state. Our biggest short-term challenge is to help the communities and the principals maintain trust in one another and the decree process. We must also get them to compromise on some issues, so that we can further improve the benefits provided by New York City’s reservoirs to the river.

Q: What do you see as the biggest challenge facing the Delaware River in the years and decades ahead?
A: In a closed system, someone’s gain usually results in someone else’s loss. Ultimately, our biggest challenge is to help the parties involved find a way to “open” the system. That is a big challenge. Part of the solution may come from improved water conservation or reuse, both throughout the basin and in New York City. Ultimately, it may require increased water supplies through additional water storage or repurposing of some existing storage.

Q: Rivers sometimes have great nicknames. What’s your favorite nickname for the Delaware River?
A: [Marie:] I grew up in the basin. Ever since I was very small I have only heard it referred to as “The Delaware.” That name means a lot. When I hear it spoken a lifetime of good memories comes flooding into my mind. I’m sure there will be many more to come in the future.

Q: What’s the wildest thing you’ve ever seen happen on the Delaware River?
A: [Marie:] Swimming in the winter. Now that gets the heart going. I would not recommend it to anyone though. It is an extremely dangerous river in the winter.

Editor’s Note: Shaun Bailey of the Partnership for the Delaware Estuary contributed questions for this article.
Looking back nearly a decade ago, New Castle County found itself at a turning point. County residents were still reeling after several severe rain events, the worst of which was from the remnants of Tropical Storm Henri. This storm dumped 10 inches of rain in 5 hours and wiped out most of the community of Glenville, which unfortunately sits downstream of most of the Red Clay Creek.

The county and DelDOT bought out 160 of the 195 homes in the community to move our citizens out of harm’s way and to restore some additional flood plain storage. During the same time, county inspectors found that many residential stormwater management facilities were nearing the end of their lifespan and were in need of major repairs. These facilities include detention and retention ponds and pipes. In most residential developments they are managed by maintenance corporations or homeowner associations.

To make matters worse, the county was not always able to determine who to contact to report these deficiencies. This is because the board members of homeowner associations change often. When they eventually did make contact, they found homeowners struggling to understand the maintenance they were required to perform on these critical facilities. In most cases, they also did not have the financial means to undertake major repairs.

Stormwater management was suddenly at the forefront of everyone’s minds. That’s why the county, with $8.9 million of state financial assistance, came to the rescue with the formation of the Stormwater Amnesty Program. The Stormwater Amnesty Program offered homeowner associations assistance with major repairs to their stormwater management facilities (major sediment [mud] removal and structural repair) in exchange for their commitment to:

1. register their contact information annually
2. perform minor preventative maintenance, like grass cutting, collecting trash, algae removal, and minor sediment (mud) removal
3. inspect their stormwater basin two to three times per year and after each major rainfall

All of the maintenance corporations’ efforts must be documented on a log and submitted to the county annually in order to remain in the program.

Entrance into the Stormwater Amnesty Program was closed at the end of 2006 for existing communities. However, new developments formed after the
Which Do I Have?

A **maintenance corporation** provides services to keep something in working order so it does not reach the point where it needs repairs.

A **homeowner association** is an organization that governs the maintenance, enhancement, and preservation of homes and properties.

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2006 amnesty date are still eligible for the same agreement, except that they are not granted amnesty for lack of past maintenance. The agreement has now been renamed the New Castle County Stormwater Maintenance Program.

Back in 2004, 75 stormwater management facilities were on the waiting list for county assistance with major maintenance. Currently, over 205 facilities in total have been added to the list for major maintenance. To date, 150 of these have already received assistance with repairs totaling in excess of $10.5 million to date. Repairs can range from the simple replacement of a trash rack to a complete redesign of the basin. When a redesign is necessary, the county uses this as an opportunity to retrofit these older stormwater management facilities. We do this to achieve increased water quality and quantity control. This helps us make progress toward achieving our water pollution and permit goals. The stormwater management basin in the development of Salem Woods is a perfect example of one of these projects.

The Salem Woods facility is a large stormwater management basin built in the early 1990s that serves over 600 homes. The pond was built with the intention of only managing water from the 100-year storm. When the corrugated metal outlet structure for this pond failed, the community sought assistance through the Stormwater Management Program. The county stepped in and funded a retrofit and reconstruction project that was managed by our partner, the New Castle Conservation District. The huge regional basin was equipped with the latest stormwater quality features, including micro pools and a staged concrete water-quality structure, which now treats 2-, 10-, and 100-year storms. Downstream water quality into the Christina River is now enhanced. The community is also the proud owner of a new stormwater management basin that should stand the test of time.

In all, the county has 285 communities that have registered to be in the New Castle County Stormwater Management Program. Many of those communities have multiple facilities covered by the program. The county has continually provided annual funding to keep the program solvent. Additional funding is provided by fees assessed to homebuilders during the development process. Though keeping this program running may be an expensive proposition, the value of cleaning our surface waters and providing flood management to our residents is priceless.
After World War II there was a big housing boom. Planners designed houses, neighborhoods and towns to funnel rainwater away as quickly as possible. Now with sea level rise and increased development many downstream communities have serious flooding and storm surge issues. Storm surges occur when tides and winds hold back flood waters from draining into larger waterways, causing additional flooding and sewer back-ups. Flooding will only get worse if we don’t start to do things differently.

There are a variety of home improvement projects that catch water, slow it down, filter out pollutants and allow the water to soak in and recharge groundwater. Below are five improvement projects anyone can choose to help reduce the quantity of water that immediately runs off their property during a storm.

**Porous Pavers**

Where a hard surface is necessary, porous pavers can be used. These interlocking pavers are spaced apart with gravel or grass (not concrete). These spaces allow rain and melting snow to soak into the ground. This porous surface has a layer of stone underneath. The spaces in between the underlying stones provide temporary storage for the water as it slowly soaks into the ground. Black ice, or the refreezing of melted snow, rarely occurs on porous walkways, because water drains through the porous paving, leaving nothing to refreeze at dusk. There are a wide variety of porous surfaces (including pervious asphalt, pervious concrete, and interlocking pavers) available to match the style of your home.

**Rain Gardens**

A rain garden contains specially chosen plants designed to help collect rainwater from hard surfaces, such as roofs, sidewalks, and driveways. The garden should be in an excavated or naturally low spot. The lowest area is filled with stone to provide an area for water to pool. The water runs off these hard surfaces, flows downhill to the rain garden, and ponds in the garden for up to 72 hours. During those 72 hours the plants and ground absorb the water, some of which also evaporates into the air. Since the rain garden is designed to only hold water for 72 hours, mosquitoes do not have enough time to breed.
Rain gardens can be all different shapes and sizes. These uniquely beautiful gardens do a great job removing pollutants like oil and other engine fluids from rainwater that flows across roads and driveways. Visit RainGardensfortheBays.org to learn more about rain garden installation and care, and to view local garden photos.

**Rain Barrels**

Rain barrels, or other types of tanks, collect and store rain from rooftops by holding diverted water from gutters and downspouts. If enough people used rain barrels, flash flooding and sewer backups could be lessened.

Rainwater collection and reuse is also beneficial to the environment. The stored water would otherwise “run off” into the storm sewers, carrying pollutants such as oil leaked from cars, lawn chemicals, and dog waste with it. Collecting rainwater from your roof during storms not only lowers your water bill, but also helps to decrease water demand during the hot summer months. Collected water can be reused to water lawns, gardens, potted plants or trees.

**Downspout Planters**

These specially designed planters are filled with gravel, soil, and then plants. A connection to the roof downspout lets rain flow into the planter and water the plants. There is another pipe that connects back to the existing downspout to drain excess water. These planters temporarily store water and filter pollutants as the water soaks down through soil and stone in the planter.

Flow-through planters are typically lined on the inside with some type of waterproofing. You can even construct them in many sizes and shapes, and with various materials, including concrete, brick, plastic, or wood. These specially designed planters not only help keep our waterways clean, but also the plants need far less watering than a typical planter during hot summer months.

**Plant more trees and shrubs!**

One of the cheapest and easiest ways to reduce stormwater runoff is to plant more trees and shrubs. Their roots absorb much more water than grass alone.

**Example: Shingle Oak (40-65 feet tall)**

In one year, a mature shingle oak will:

- Reduce carbon dioxide and other air pollutants by almost 1,000 pounds
- Soak up to over 16,000 gallons of stormwater runoff
- Save almost 400 Kilowatt-hours of electricity for cooling and reduce use of oil or natural gas by 900 cubic feet

In addition to cleaning the air and water, trees also regulate temperature and add to the property’s value.
Most of us have owned a vehicle, a home or both. We all know the temptation to put off repairs a little longer, and then a little longer. However, we also know that a vehicle or a home requires investment in maintenance and repairs. What is true for vehicles and homes is true for everything else we build. The moment we start using anything, it moves toward falling apart. Only investment will keep up its value.

Our drinking water investments are no different. Our water supply wells, intakes, treatment systems, finished [treated] water reservoirs, towers, pumps and distribution pipelines are all built with the knowledge that they will fail if not maintained and, eventually, rebuilt or replaced. Likewise, our sewer pipelines and treatment plants, and our stormwater systems, all experience decline unless we invest in keeping them functional. Seen this way, whenever we build water infrastructure, we are also buying the future financial liabilities of maintaining or replacing it. There is no way of avoiding these costs; they come sooner or later, and much sooner if we don’t do a good job from the start.

The urbanized areas of the Delaware Estuary and surrounding areas — cities, suburbs and small towns — depend on having sound water supply, sewage and stormwater systems. The problem is that our water infrastructure is aging. Water lines in our historic urban areas are often 100 years old or more. Sewers in the Camden and Philadelphia urban centers can date back 150 years — to near the Civil War. Even our relatively new suburbs are approaching middle age, same as the baby boom generation that grew up in them. Whether boomer infrastructure or Victorian, it all needs to be maintained, reconstructed or replaced now or fairly soon.

Unfortunately, the evidence is clear that “out of sight” truly has been “out of mind.” Recent research by my Rutgers University team for New Jersey Future points to an inescapable conclusion. And this is confirmed by recent reports and recommendations from Pennsylvania and New Jersey. We focus our dollars on maintaining water supply and wastewater treatment plants so that they meet regulatory requirements. We have done nowhere near enough work on maintaining our pipeline infrastructure. As a result, the rate of pipeline failures (and the associated emergency repair costs) is taking a toll on utility services. Many treatment plants also need improvements and maintenance.

There is good news, though. Philadelphia has committed to major efforts for control of sewers that can overflow into waterways during storms (i.e., combined sewer overflows). Philadelphia is creating “green infrastructure” that beautifies neighborhoods while controlling stormwater before it gets into the sewers.

The City of Camden has begun similar efforts through Camden SMART. The Camden County Municipal Utilities...
in Years Ahead

By Daniel J. Van Abs, Ph.D.,
Associate Research Professor, Rutgers University

Authority (CCMUA) is a leader with the Camden SMART team. The city has also been improving its major treatment plant in a way that actually reduces net costs through energy efficiencies and other savings. New Jersey’s new combined sewer permits emphasize the importance of green infrastructure. They also emphasize asset management programs. The purpose is to improve their systems’ maintenance and capital improvement efforts. New Jersey is also requiring that water utilities develop better management programs if they want low-interest loans for water infrastructure projects. And many utilities are doing the best work possible within their limited revenues.

The problem, as always, is one of costs and who pays. While in some cases immediate cost savings can be realized, such as for the CCMUA, in most cases the savings will come over decades while the costs occur now. While nobody will be pleased to pay higher rates, we must recognize that by deferring these costs our difficulties will get worse even faster. Most people will be able to afford the utility rates that will result, while other households will need assistance. Everyone should recognize that:

1. the need for investment in our water utilities is inevitable
2. the costs will get worse the longer we wait
3. failure is not an option, and
4. better water infrastructure will benefit our society now and in the long term.

As noted in the “Agenda for Change” recently released by New Jersey Future, we have let our water infrastructure go for too long. It is time to face the issue with expertise and a commitment to action. ■

Additional Resources:


New Jersey Future. 2014. Ripple Effects and “An Agenda for Change for New Jersey’s Urban Water Infrastructure.” Available at www.njfuture.org/water


Revolution-era Dam Surrendering to Shad After Two Centuries

By Martha Narvaez, Associate Policy Scientist, and Gerald Kauffman, Director, University of Delaware Water Resources Agency

The White Clay Creek National Wild and Scenic River is benefiting from an $85,606 grant awarded to the University of Delaware. This award is the result of a national partnership between American Rivers and the National Oceanic and Atmospheric Administration. American Rivers selected the White Clay Creek restoration project as one of just six projects in California, Delaware, Massachusetts, and Oregon. Applicants submitted over 200 grant proposals nationwide.

This project is designed to remove White Clay Creek Dam No. 1. Removing this dam will reopen 3.5 miles and 42 acres of spawning habitat along the designated wild and scenic river in New Castle County. This will restore passage for American shad, hickory shad, and river herring.

Removal of the historic colonial mill’s timber crib dam is planned for later this summer or fall. Its removal will restore passage for migratory fish for the first time in over two centuries. Miller, Daniel Byrnes constructed the dam before the 1777 Battle of Cooches Bridge during the American Revolution. As the first dam removal project in Delaware, this is the first step in a five-year plan to remove six more upstream dams. Removing these dams will reopen fish passage for 14 miles, from the estuary inland through Newark into Pennsylvania. The American Rivers grant is funding a research team including the:

- UD Water Resources Agency
- UD Center for Historic Architecture and Design
- UD Department of Geological Sciences
- UD Civil and Environmental Engineering Department
- U.S. National Park Service
- White Clay Creek Wild and Scenic Watershed Management Committee
- Delaware Division of Fish & Wildlife
- United Water Delaware
- Delaware Park, Inc.

Over 180,000 people, or 20% of the First State’s population in New Castle County, draw drinking water from this 107-square-mile “watershed,” or river valley in Pennsylvania and Delaware. In 2000, President Clinton signed the legislation introduced by Senator Joe Biden to designate the White Clay Creek as Delaware’s first wild and scenic river. This made it the first-ever national wild and scenic river protected on a watershed basis. The University of Delaware is the only college in the United States that has a national wild and scenic river flowing through campus.

**Did You Know?**
The Delaware River Basin contains over 1,400 dams. That’s about one dam for every 10 square miles.

**Fisheries Biologist, Matt Fisher holds an American shad blocked by White Clay Creek Dam No. 1 in Stanton, Delaware. Bayard Conaway set the record for Delaware’s biggest shad in 1972 when he caught one in the Brandywine River weighing almost seven pounds.**

**It may not look like much, but this dam may as well be Niagara Falls to a migratory fish. Its three-to-eight-foot height prevents them from accessing over three miles of the White Clay Creek downstream of Newark, Delaware.**
Pennsylvania Coast Day
September 6, from 11 a.m. to 4 p.m.
Philadelphia, PA
Discover Pennsylvania’s coastal connection at Pennsylvania Coast Day, hosted by the Partnership for the Delaware Estuary. Attractions at Penn’s Landing will include boat rides, kayaking, kids crafts, face painting, swan boats, exhibits and more. Dive in to DelawareEstuary.org for details, or call (800) 445-4935, extension 112.

Citizen Science Workshops
September 17-18, 25, and October 1
Sites in DE and PA
The Partnership for the Delaware Estuary will host several workshops to show volunteers how to survey streams for freshwater mussels. This will help experts catalog what is left of these all-natural water filters. To register, please call Dee Ross at (800) 445-4935, extension 106. Registration is required.

International Coastal Cleanup
September 20 | Worldwide
Last year almost 650,000 volunteers collected over 12 million pounds of trash during the International Coastal Cleanup. You can join this worldwide movement in a community near you. Simply visit http://1.usa.gov/1kJWxg for details in Delaware. Log on to NJClean.org for news in New Jersey. And visit http://bit.ly/14lnB8x for plans in Pennsylvania.

Bass Tournament
October 5, from 7 a.m. to 1 p.m.
Gloucester City, NJ
Create your own big-fish story by participating in a tournament hosted by the Delaware River Fishermen’s Association. Fishing from shore is permitted and all it will cost is $10 and a membership fee. See for yourself at DRFishermen.com. And the best parts? This contest is winner take all, as well as catch and release.

Featured on ecoDelaware.com
Delaware Coast Day
October 5, from 11 a.m. to 5 p.m.
Lewes, DE
Stop by the Partnership for the Delaware Estuary’s table at Delaware Coast Day, just steps from Delaware Bay. Visit DECoastDay.com to see how you can meet wild animals, taste seafood, tour ships, rediscover gardening, and interact with scientists in their labs. Call (302) 645-4234 for details.

Old City Seaport Festival
October 10-12
Philadelphia, PA
See Philadelphia like its founders did — from the deck of a seagoing ship — during the Old City Seaport Festival. The PDE will be there on Saturday to help interpret the Delaware River, the largest freshwater port system in the world. Log on to PhillySeaport.org.SeaportFestival for info, or call (215) 413-8655.

Featured on ecoDelaware.com
Blackbird Creek Fall Festival
October 18, from 10 a.m. to 4 p.m.
Townsend, DE
Surround yourself in autumn colors as you enjoy free hikes, hayrides, live music, kids crafts and more on the banks of Blackbird Creek. The Partnership for the Delaware Estuary will be among the many exhibitors on hand. Visit http://1.usa.gov/pA8i1A for details, or call (302) 739-3436.

Delaware Estuary Science & Environmental Summit
January 25-28 | Cape May, NJ
Information is now available for the Delaware Estuary Science & Environmental Summit, located at the Grand Hotel. This event’s theme will be Balancing Progress & Protection: 10 Years of Science in Action. Its program will address a wide range of issues, both new and old. Early-bird registration will begin this fall. For more info, please log on to DelawareEstuary.org. Callers can also inquire by dialing (800) 445-4935, extension 105.
Partnership for the Delaware Estuary: a National Estuary Program

The Partnership for the Delaware Estuary, Inc. (PDE), is a private, nonprofit organization established in 1996. The PDE, a National Estuary Program, leads science-based and collaborative efforts to improve the tidal Delaware River and Bay, which spans Delaware, New Jersey, and Pennsylvania. To find out how you can become one of our partners, call the PDE at (800) 445-4935 or visit our website at www.DelawareEstuary.org.

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