ASHOKAN WATERSHED STREAM MANAGEMENT PROGRAM

Fall 2022

Esopus Creek NEWS

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COOPERATIVE EXTENSION
ULSTER COUNTY

Esopus • Birch • Bushnellsville • Fox Hollow • Peck Hollow • Broadstreet Hollow • Woodland Valley • Stony Clove • Beaver Kill • Little Beaver Kill • Traver Hollow • Bushkill

IN THIS ISSUE

What is WATER RESILIENCE?

It sounds like the latest buzzword, but the concept behind this phrase is something we are all thinking about. Will we have access to enough clean water? Will we face frequent flooding and too much water? To survive the extremes of water variability a community needs to be resilient.

The Pacific Institute, a U.S. non-profit organization that is engaging with corporate leaders and policymakers, defines water resilience as:

"The ability of water systems to function so that nature and people, including those on the frontlines and disproportionally impacted, thrive under shocks, stresses, and change."

A mostly dry stream channel looking upstream from the Kingston Water Supply intake for Cooper Lake in the Mink Hollow portion of the Beaver Kill stream, July 2022.

In a *Water Resilience Brief*, the Institute lays out some ways to improve water resilience. One is to reduce dependence on unreliable or energy-intensive water sources. Another is to improve water use efficiency. An approach already being used in the Ashokan Watershed is to integrate nature-based solutions with hard water infrastructure. The *Water Resilience Brief* states that in all cases, water resilience must prioritize all stakeholders, including frontline communities and the environment. Frontline communities include people in rural areas, people of color, Indigenous Peoples, and others.

Water resilience planning without a proper structure to partnership agreements can lead to unevenly distributed benefits, according to Cornell University in a recently published research article on how funding of critical water infrastructure may play out in California. The authors point to considering multiple factors to make sure investments can satisfy all partners. Investments in water infrastructure should consider whether enough water will be present to make the investment worthwhile, pair projects to maximize benefits, and make sure large partnerships don't lead to one partner performing poorly.

The Ashokan Reservoir watershed is covered by a ground-breaking partnership agreement focused on water management called the NYC Watershed Memorandum of Agreement (the "MOA") announced in 1997. The agreement establishes a large partnership of downstate water users, environmental parties, and upstate

Cont. on page 2

Cont. from page 1

Water resilient systems are:
- Robust
- Redundant
- Flexible
- Integrated
- Inclusive
- Just and Equitable

- *Water Resilience Brief*, Pacific Institute

communities and organizations with a goal to cooperate in the development and implementation of a NYC Watershed protection program. It establishes funding mechanisms and a framework to create nature-based solutions for conserving water resources, paired with hard infrastructure improvements. See the 'Stream Management Program' article later in this newsletter for more information on how the MOA includes management of stream corridors.

Steps municipalities in the Ashokan watershed are taking to build water resilience include:

- Building adaptation into construction standards. For example, implementing requirements to elevate structures above flood elevations, construct with materials resistant to flooding, and anchor structures in areas of special flood hazard.
- Modeling future stream flows when resizing culverts and bridges and building the largest structure feasible.
- Conducting natural resource inventories and identifying critical environmental areas such as undeveloped floodplains that store and slow flood waters. Floodplains and wetlands also increase water infiltration to recharge the groundwater supply needed during times of drought. See this short video about steps the Town of Warwarsing has taken as an example: https://www.youtube.com/watch?v=PrB-0CvRNJM
- Resisting development in the most active, dangerous portions of floodplains and locating community growth elsewhere. This may involve community planning and enforcement of existing policies. It may involve allowing sellers of floodprone properties to enter voluntary buyout and relocation programs rather than continue to face hazards and repeated economic losses. Some properties are so prone to flooding they represent a threat to the town tax base rather than a benefit.[1, 2]
- Basing plans on science-based information. For example, conducting flood studies that include engineering modeling and benefit-cost analysis of potential flood mitigation solutions.
- Restoring stream flow access to floodplains during stream and transportation projects. In some cases, enhancing the capacity of existing floodplains by enlarging them.
- Implementing water resilience projects to show results and win state and federal adaptation grants that increase support for local costs.
- Improving flood emergency preparedness and recovery planning.
- Upgrading wastewater systems and other water infrastructure.

[1]Are Floodplain Buyouts a Smart Investment for Local Governments. Final Report for the UNC Policy Collaboratory: https://coastalreview.org/wp-content/uploads/2018/09/Project-Report-Floodplain-Buyout1.pdf

[2]Buy-In for Buyouts: The Case for Managed Retreat from Flood Zones. Lincoln Institute of Land Policy, Cambridge, MA: https://www.lincolninst.edu/publications/policy-focus-reports/buy-in-for-buyouts

New York City is investing millions to repair or replace aging water infrastructure and improve resilience, such as $47 million to rehabilitate the Shandaken Tunnel Intake Chamber that controls the flow of water from Schoharie Reservoir to the Esopus Creek and the Ashokan Reservoir. Ashokan Reservoir photo by A. Lent.

Sources of more information:

https://pacinst.org/publication/water-resilience/

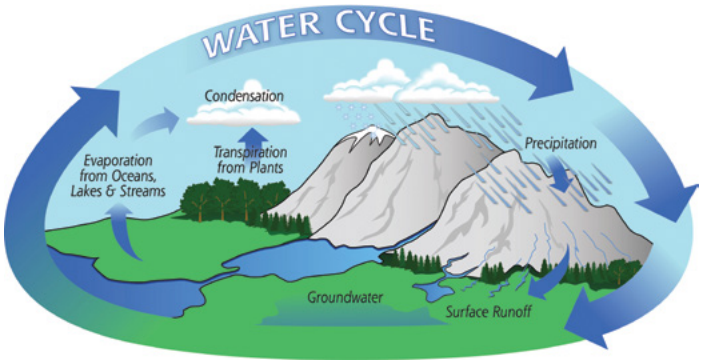
https://www.engineering.cornell.edu/news/study-examines-financial-risks-water-resilience-planning-california

https://resilientconnecticut.uconn.edu/planning-tools/10-steps/

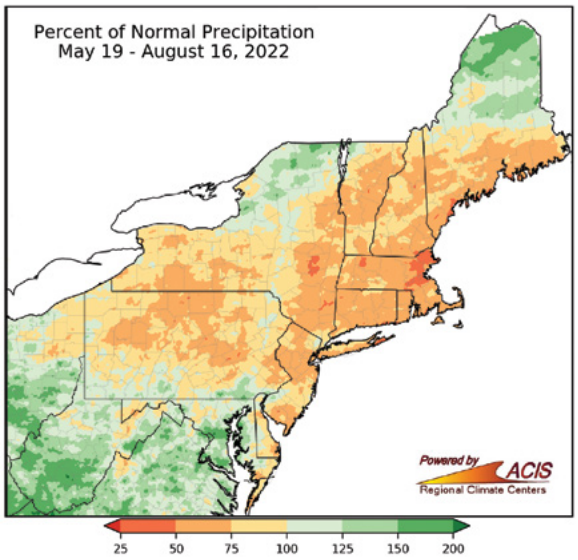
Since this photo was taken after flooding in 2011, the intersection of Route 28 and Route 212 in Mt. Tremper has been reconfigured and elevated as part of a flood mitigation project to enlarge the Route 28 bridge over Esopus Creek.

Droughts

Droughts, like floods, have occurred in biblical proportions throughout history. The period of "abnormally dry" conditions this summer in Ulster County is nowhere near that magnitude, but it is important to remember that droughts and floods are both natural occurrences, they can range from mild to extreme, and they should be planned for.



From: https://gpm.nasa.gov/education/water-cycle



From the Northeast Regional Climate Center update posted August 18, 2022.

Droughts can be viewed from multiple angles. A lack of precipitation is a meteorological drought. However, precipitation is only one part of the larger hydrologic cycle (see the Water Cycle illustration above). A hydrological drought is determined by streamflow, which also accounts for factors like groundwater levels, water use by vegetation, and evaporation, often reported together as evapotranspiration (ET).

From a meteorological perspective, Ulster County was in a mild drought because over a 90-day period the county only received somewhere between 50 and 75% of the normal amount of rainfall. July 2022 was the 5th driest July on record with total monthly precipitation that was 2.52 inches below normal.

From a hydrological perspective, the drought looked slightly worse. The USGS stream flow gage on the Esopus Creek at Allaben (01362200), with 58 years of continuous flow data, reported daily stream flow in the 13th percentile, meaning flow in the Esopus was that low (or lower) only 13% of the time. The stream gage at Allaben is upstream of the Shandaken Tunnel which transfers water from the Schoharie Reservoir to the Esopus Creek upstream of the Ashokan Reservoir.

At least some of the difference between the precipitation deficit and the streamflow deficit can be attributed to the abnormally high temperatures in late July and early August. More evaporation is possible at high temperatures since warmer air can hold more water vapor.

Either way you look at it, the Ashokan Reservoir watershed and much of western Ulster County experienced a mild drought, or an "abnormally dry" period this year according to the Northeast Regional Climate Center drought monitor. Parts of southeast Ulster County were in a "moderate drought." . The Department of Environmental Conservation declared Ulster County in a drought watch, meaning there were no statewide mandatory water restrictions. However, local public water supplies can issue mandatory conservation measures.

Here are a few relatively easy ways to reduce how much water you use during a period of drought:

- Only water lawns if necessary. It is natural for grasses to go dormant and turn brown in the summer. Lawns can go dormant for six weeks without dying.
- If you water your lawn, do it early in the morning to reduce loss to evaporation.
- Reuse water collected in dehumidifiers, air conditioners, and rain barrels to water plants.
- Raise lawn mower deck heights (longer grass has longer roots and needs less water).
- Use a broom, not a hose to clean driveways and sidewalks.
- Only run dishwashers and washing machines when full.
- Fix leaking pipes, hoses, and faucets.

Sources of more information:

Here are additional resources to monitor drought conditions:

New York Extension Disaster Education Network (Drought): https://eden.cce.cornell.edu/natural-hazards/drought/

Northeast Regional Climate Center: https://www.nrcc.cornell.edu/

USGS Water Watch Streamflow: https://waterwatch.usgs.gov/?m=real&r=ny&w=map

NYS DEC Current Drought Conditions: https://www.dec.ny.gov/lands/5017.html

Drought Conditions for Ulster County: https://www.drought.gov/states/New-york/county/Ulster

FIELD NOTES

Toddlers & Tributaries

In August, the AWSMP held our first program for preschool-aged children. The the Toddlers & Tributaries event was held in a safe, outdoor setting at Kenneth L. Wilson Campground in Mt. Tremper. The toddlers with their guardians spent the day in activities examining their surroundings. The group interacted with a small tributary of the Little Beaver Kill for sediment collection, macroinvertebrate catching, and a rubber duck stream race.

The program ended with a story time reading of "Little One and the Water," an AWSMP-funded children's book written and illustrated by Will Lytle. Sign up to be notified of all our upcoming events at info@ashokanstreams.org.

Panther Kill Project

AWSMP's second stream restoration project this year is underway on the Panther Kill about 1,000 feet upstream of the Woodland Valley bridge in the Town of Shandaken. Panther Kill is the largest tributary to Woodland Creek.

The project stabilizes about 600 feet of eroding stream and chronic slope failures. Following a major flood on December 25, 2020, this site became a leading source of turbidity in the watershed. Construction will run through September. The construction contractor is Hubbell and the design engineering firm is Stantec. Ulster County Soil & Water is the project manager.

Natural Stream Buffers in the Landscape

Landowners can explore just how beautiful a stream buffer can be at the "Brookside Wander," a trail and buffer planting demonstration located on grounds of the Emerson Resort & Spa in Mt. Tremper. While native trees and shrubs are the best choice to plant immediately adjacent to the stream channel (for the benefit of stabilizing stream banks and shading the channel), flowering perennials and shrubs can be added for their landscaping values.

One of the benefits of a wilder "garden" like a stream buffer, is watching how the planting evolves. A seed mix is spread and over the next few years the plants reach for the sun, compete for water and nutrients, and spread seeds and pollen. Eventually a lively mix of flowers attractive to a wide variety of pollinators such as bees, birds, and butterflies will emerge.

The pleasure of watching the planting and the wildlife it supports through the seasons is invaluable.

To visit the Brookside Wander project, use the furthest east driveway entrance off Route 28 at the Emerson Resort. The guided trail is located in the adjacent field. The streamside buffer was designed and installed by the Catskill Streams Buffer Initiative implemented by the Ulster County Soil and Water Conservation District in the Ashokan Reservoir watershed.

Contact the AWSMP office to learn more and request buffer planting assistance at info@ashokanstreams.org or (845) 688-3047.

Vegetation is the Long Game for Bank Stability

See the time lapse photos below of a site on Woodland Creek following a massive flood (Tropical Storm Irene) in 2011 and the same site again in summer of 2022. Native willow shrubs and sycamore trees have recolonized the site to provide some impressive bank stabilization! An interesting fact about native willow and sycamore is they are advantageous rooters, meaning they can grow from parent plant material and they don't necessarily need to start from a seed. An area just upstream of this site was full of willow and sycamore before Irene struck. It is likely that the flood uprooted sycamore and willow and as sediment was deposited when the floodwater receded, it buried plants that then grew into a beautiful Esopus valley riparian plant community.

Woodland Creek in 2011 after flood devastation.

Woodland Creek in 2022 after natural revegetation.

Stream Creature Feature: American Beaver

Beaver were once abundant in Catskill streams and shaped stream corridors in ways it's hard for us to imagine now. Currently, it seems that beaver are most active in the Warner Creek, Beaver Kill, Little Beaver Kill, Bushkill, and Kanape Brook tributaries to the Esopus Creek.

During a walkover of the accurately named Beaver Kill in the towns of Woodstock and Shandaken, Bobby Taylor of Ulster County Soil and Water found beaver-chewed wood embedded in apparent lake deposits exposed in an eroding clay bank. Geologists from the New York State Museum obtained samples and carbon-dated the wood to around 500 years old. This evidence suggests beavers have inhabited willow thickets in the watershed for a long time!

The American Beaver.

A beaver dam complex on Kanape Brook in the Bushkill watershed.

Before beaver were nearly eradicated for consumer purposes by the late 19th century, their environment featured slow-moving water, convoluted and interconnected streams, wet meadows, and brushy areas. Beaver were reshaping entire watersheds and connecting habitats.

Streams impacted by beaver naturally evolve toward complex, multi-channel systems where wildlife can travel, plants and nutrients can accumulate, and aquatic life can rest in cooler, slow-moving water. Not only are beaver beneficial to the ecosystem, but they have a positive impact on stream stability as well. Beaver create habitats that can restore deteriorating streambanks, reduce the rate of flooding downstream, enable more groundwater percolation, and strengthen sediment retention!

As North America's largest rodent, beaver primarily eat bark, favoring Dogwood, Willow, and Alder trees. They use the remaining wood as building material to expand their dams, eventually constructing beaver ponds. These ponds create canals and large pools in streams and wetlands that form on surrounding floodplains.

Beaver are considered a keystone species – meaning they support and help define an entire ecosystem, providing many benefits. By removing a keystone species, we risk altering the landscape radically and causing the loss of unique wildlife habitats altogether. Luckily, over time beaver have become protected in New York and can once again transform their surroundings. By creating short-term habitats that routinely change, they enable a dynamic landscape for other species.

Beaver can raise groundwater when they reshape the landscape by enlarging their ponds and connecting wetlands. As the climate changes, this activity may act to conserve cold water and protect biodiversity, including trout, in streams impacted by drought and warming. More research is needed on this topic as things continue to evolve.

Beaver sometimes form dams that raise groundwater near infrastructure like

road culverts causing flooding issues. If beaver are causing significant issues, property owners have a few options. They can adapt and let beaver reestablish their habitat, they can apply for a permit from the NYS Department of Environmental Conservation and hire a humane trapper (if approved), they can utilize a flow device, or they can wrap trees to deter them from creating more dams.

Although beaver occasionally interfere with nearby property by expanding their dams, their presence provides many environmental benefits for stream restoration and water quality in general. Each property owner's situation is different and various measures can be taken to alleviate land issues caused by beaver. Regardless, it is both possible and important to coexist harmoniously with beaver for the overall health of streams and all who inhabit in and around them.

See more information about American Beaver on this webpage that local readers might be interested in and some materials for kids, too:

https://ulster.cce.cornell.edu/environment/online-science-series/watershed-animal-spotlight

Did you know this watershed has a Stream Management Program?

In case you are wondering where this newsletter comes from and who we are, let us introduce ourselves - we are the Ashokan Watershed Stream Management Program! You may be familiar with watershed organizations operating in other regions of New York or the country. At the AWSMP we're a little different, because while we operate within the boundaries of a watershed – specifically the watershed lands draining into the Ashokan Reservoir, our program is mostly focused on managing stream corridors.

It's rare to have a stream management program operating within your watershed. If you Google "stream management program," you'll notice there is a comprehensive river management program operating in Vermont, and state-funded river networks and stream management plans underway in Colorado and some Mid-Atlantic states.

But almost nowhere else is a large municipality, in this case New York City, supporting a stream management program to protect its water supply and to benefit local communities. The situation really is unique.

Here are comments of the National Academy of Sciences after reviewing the NYC Watershed Program in 2020:

"The SMP (Stream Management Program) stands out among stream restoration efforts nationwide in that its approach focuses on whole watersheds, and substantial attention is given to scientific investigation, stream corridor mapping, and long-term water quality monitoring."

- National Academy of Sciences, Review of the New York City Watershed Protection Program, page 198, Conclusions and Recommendations

We are the Ashokan Watershed Stream Management Program or "AWSMP" for short.

The stream management program was established following the historic creation of the New York City Watershed Memorandum of Agreement in 1997. The Agreement set forth a regional framework for the long-term protection of New York City's drinking water, and the economic vitality of Upstate Watershed communities.

To meet its obligations under the Agreement and to comply with a Filtration Avoidance Determination, New York City established a Stream Management Program as part of long-term watershed protection. There is now a locally delivered Stream Management Program operating in each of the NYC reservoir watersheds in the Catskill-Delaware portion of the NYC water supply system.

The Ashokan Reservoir's stream management program is delivered by the Ulster County Soil and Water Conservation District and Cornell Cooperative Extension with funding from NYC.

Action planning in the Ashokan Reservoir watershed began in the early 2000s. A first task was to form the AWSMP Stakeholder Council with representatives from watershed municipalities, landowners, business owners, non-profits and government agencies.

Stream management plans were first published for the Broadstreet Hollow Creek (2003), Stony Clove Creek (2004) and the Upper Esopus Creek (2007). The "upper" Esopus Creek refers to the river upstream of the Ashokan Reservoir.

Stream management plans identify areas where property owners and municipalities can take action to reduce erosion, protect property and infrastructure, and improve water quality and habitat.

Work to develop and update stream management plans continues. But plans are of no use if they are never implemented. The AWSMP directly implements some of the recommended management actions identified in stream management plans.

With funding from the NYC Department of Environmental Protection, and the federal government when available, the Ulster County Soil and Water Conservation District manages projects to repair and restore streams at locations generating the most threat to local water quality.

Stream Assessment Leader Allison Lent has been with the program since 2012 and recently earned a Master's Degree in Civil Engineering with a specialization in water resources.

The District monitors erosion throughout the watershed to identify and rank sites for treatment.

So far, about 3.5 miles of stream and 5 acres of hillslope have been stabilized to restore natural stream functions at 16 project locations. Projects are monitored for success after construction and research is underway to evaluate project effects on water quality and aquatic habitat.

In addition, Cornell Cooperative Extension of Ulster County manages a community grants program that provides

funding to local governments, schools, and non-profit organizations to implement stream projects. Funded projects include stream restorations, improvements to public infrastructure, flood hazard mitigation, and research and monitoring. The grants program has funded 98 projects totaling over $7,000,000 in the Ashokan watershed since it began in 2009.

After the devastation caused by Tropical Storm Irene in 2011, the stream program, working with partners throughout the NYC Watershed, developed a funding and technical assistance program to assist communities with flood prevention and preparedness. Over the last 10 years, the watershed towns, Ulster County, and New York State have completed major flood mitigation projects in the Ashokan watershed with assistance from the stream program. The projects use best-available engineering and computer modeling practices.

To directly benefit streamside landowners and families in the watershed, the stream program offers free technical assistance visits for landowners with stream issues. In addition, landowners can request and receive free assistance with enhancing or revegetating streamside areas through a program called the Catskill Streams Buffer Initiative.

Education staff practice a stream bar sampling activity in preparation for an event. From left to right clockwise: Matt Savatgy, Matt Helffrich, Danielle White, and Laura Gust. Photo by Tim Koch..

The AWSMP also runs a robust education program offering learning opportunites about stream and floodplain management and the Ashokan watershed. The AWSMP provides training programs for local municipal officials. A special engagement with the Onteora Central School District, summer schools, and an afterschool program delivers hands-on water science education to youth. Check the AWSMP website for announcements about events during the year such as the Ashokan Watershed Conference and Stream Explorers Youth Conference.

The AWSMP Stakeholder Council remains an active and vibrant component of the stream program. The volunteer Council guides the AWSMP and helps to establish priorities for community funding. The Council advances special topics such as stream access and recreation, stream ecology, flood mitigation, and highway management.

For more information about any of the programs listed above or about volunteering to serve on the AWSMP Stakeholder Council, call (845) 688-3047 or email info@ashokanstreams.org or.

The AWSMP Stakeholder Council has broad interest in local stream management, including a focus on stream access and recreation and stream ecology. Here an angler in the Esopus Creek enjoys an early fall day.

For more information:

Ashokan Watershed Stream Management Program: https://ashokanstreams.org

Ashokan stream management plans online: https://ashokanstreams.org/publications-resources/stream-management-plans/

CSBI: https://catskillstreams.org/catskill-streams-buffer-initiative/

New York City Watershed Program: https://dos.ny.gov/new-york-city-watershed-program

New York City Water Supply Watersheds: https://www1.nyc.gov/site/dep/environment/about-the-watershed.page

New York City's Filtration Avoidance Determination: https://www.health.ny.gov/environmental/water/drinking/nycfad/

Esopus Creek News

AWSMP UPCOMING EVENTS

Now

Between September and October, our native brook trout migrate to find suitable spawning habitat. Their migration can be blocked by hand-built rock dams at swimming holes. After a hot, dry summer let's give them a hand by removing enough rocks for fish to pass through the dams at low stream flow.

In early 2023

In early 2023, watershed landowners with streams on their property will receive a survey from Cornell University and the AWSMP. The survey asks for input on stream management priorities and needs. The results will guide local services. Look for a blue booklet with the University logo arriving in January.

Ashokan Watershed Stream Management Program

Cornell Cooperative Extension Ulster County

Soil and Water Conservation District

NYC Environmental Protection

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