

Resilient Communities and Streams in the Upper Delaware Region

Adapting to climate change with “no-regrets” solutions

ISSUES: FLOODING, WATER QUALITY PROBLEMS, AND AQUATIC HABITAT DEGRADATION

Existing infrastructure challenges

Water is essential for life. For millennia, humans have lived near water bodies like rivers and lakes. When a flood occurs, this puts communities at risk. Compounding this problem is the fact that many roads, bridges, culverts, and storm drains were built before modern regulations were in place that would improve their ability to withstand high flows. Small, round culverts are often a barrier to fish passage, as well.

Human development has changed the way water moves across the land—buildings and pavement speed up runoff during storms and reduce infiltration into the ground.



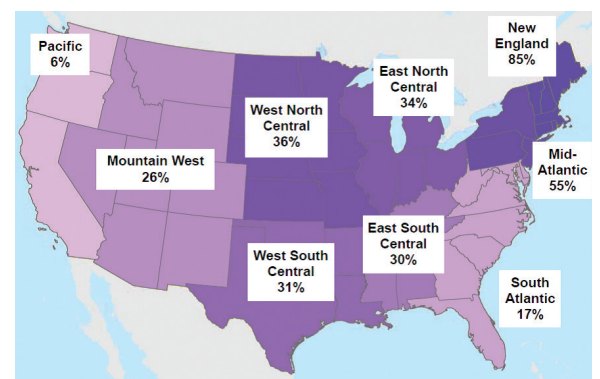
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Inadequately sized culverts and bridges can be washed out by high stream flows.

Changing weather patterns in the northeastern U.S. are exacerbating the existing problems that worsen floods and degrade freshwater habitat

Heavy precipitation events are more frequent

Heavy rainfall and flooding events are already occurring with greater frequency and magnitude in the upper Delaware River region and northeastern U.S., and this trend is projected to continue through the next half-century. A greater percentage of our annual precipitation is delivered through heavy storms. More rain falling in shorter periods of time increases the risk of flooding and associated problems, including damage to infrastructure. Stronger flows during storms contribute to streambank erosion and changes in stream channel structure, especially where streams have been modified or constrained. Channelized and incised streams become disconnected from their floodplains, reducing their ability to mitigate floods and filter sediment and nutrients.



Madsen and Willcox 2012

The frequency of extreme downpours has increased over the last several decades (by 85 and 55 percent in New England and Mid-Atlantic states, respectively).

Habitat degradation and increasing stream temperatures

Cold-water fish species such as brook trout are particularly vulnerable to climate change impacts. Warmer air temperatures can raise water temperatures, especially if forest cover is insufficient, making canopy closure an increasingly important objective in riparian (streamside) areas. Earlier snowmelt and peak stream flows in spring, combined with higher rates of evapotranspiration in hot weather, could result in lower summer and fall flows. Low summer flows will exacerbate thermal stress problems for trout and potentially cut them off from parts of their habitat where they could seek refuge from warm temperatures.

Nature-based solutions

In many situations, a combination of natural and built infrastructure can be utilized to mitigate flood impacts in the future while also improving habitat for freshwater species. Identifying opportunities to address multiple goals can also open the door to more funding for a project.

Freshwater adaptation strategies

- Plant forested buffers where absent along streams and increase the width of forest buffer lands along shorelines and streams to maintain shade and filter runoff.
- Monitor riparian forests closely for forest pests and invasive plant species to catch problems early, especially where hemlock trees are prevalent.
- Retain coarse woody debris like fallen trees on the forest floor and in riparian areas to help slow runoff, filter water, and improve habitat.
- Minimize road networks by planning ahead, and install best management practices (BMPs) to reduce the impact of existing and new roads on streams.
- Size culverts to accommodate increased peak stream flows. Consider fish passage when replacing or installing new stream crossings; fish-friendly designs that mimic a natural streambed are often better able to withstand peak stream flows than traditional round culverts.
- Work with professionals (from conservation districts, the Natural Resources Conservation Service (NRCS), or conservation organizations) to restore streambanks, improve in-stream habitat, and reconnect floodplains where appropriate.
- Resist the urge to “clean out” or straighten streams after floods; such dredging and channelization can destroy habitat and worsen flooding downstream, especially over the long-term. Consult with resource management professionals to address flood damage in ways that enhance natural functions and habitat while still protecting public safety.
- Arrange trainings for government employees and contractors on topics such as stream assessment and emergency post-flood response protocols, so crews are more knowledgeable about what to do—or not do—to stabilize an area in the event of a flood.
- Incorporate future precipitation models and flood scenarios into comprehensive plans and hazard mitigation plans.
- Prepare watershed or stream corridor management plans to prioritize locations and actions to address flooding and fish habitat issues.



U.S. Fish and Wildlife Service CC BY 2.0

Brook trout need cold, clean water and adequate summer stream flows to thrive.



Chris Smith, U.S. Fish and Wildlife Service CC BY-NC-ND 2.0

After Hurricane Irene damaged this 200-foot section of streambank in Vermont, it was stabilized in a way that also improved aquatic habitat.



Katrina Mueller, U.S. Fish and Wildlife Service CC BY-NC-ND 2.0

After a flood, a 5-foot round culvert was replaced with this fish-friendly 14-foot arch culvert.

Sands Creek Restoration Project Tackles Multiple Watershed Needs on the Upper Delaware River

Residents of Delaware County, NY in the headwaters of the Delaware River are acutely aware of climate change impacts and the increasing severity and frequency of storms.

The county sits near the top of the list nationally in federally declared flood events: massive storms in 2004, 2005, 2006, and 2011 left a swath of destruction behind that included loss of life, devastating floods, infrastructure damage, aquatic habitat impacts, and depleted local budgets that could not keep pace with reparation costs.

Friends of the Upper Delaware River (FUDR), a local community-based watershed conservation organization headquartered in Hancock, NY, saw an opportunity to repair and restore the Sands Creek watershed while, at the same time, strengthening its resiliency to climate change impacts for multiple community benefits.

FUDR's first step was to build a team of diverse partners that included elected officials, government agencies, conservation organizations, hunter/angler organizations, civic associations, landowners, and local businesses. Each of these groups understood that repairing the watershed and enhancing its ability to withstand the increasing threats of climate change was the best way to meet everybody's needs in the community.

Thanks to a willing streamside landowner named Mary Ann Nichols who understood the long-term importance of the project to the community, FUDR secured access to more than a mile of the creek and developed an innovative design for the project. The local, regional, and national conservation community—Trout Unlimited, the Pinchot Institute for Conservation, the National Fish and Wildlife Foundation, Theodore Gordon Flyfishers, and the Orvis Corporation—contributed critical funding to support project design and construction. The Town of Hancock, NY and Delaware

County natural resource agencies provided invaluable in-kind support, technical expertise, and construction equipment. Once permits were secured, nine “treatments,” mostly consisting of the placement of woody material, were installed over a three-month period in the spring and summer of 2015, and two additional treatments were completed in summer 2016.

There are several important elements of this project that make it a desirable model for future stream restoration efforts everywhere:

- It involved multiple partners from diverse constituencies, all of whom benefitted from the work at Sands Creek.
- It was completed at a relatively low cost compared to other more traditional infrastructure repair approaches.
- It generated multiple community benefits including public safety, flood mitigation, infrastructure protection, water quality enhancements, and aquatic habitat improvements.
- It generated local jobs and educated local engineers and construction workers about a cutting-edge approach to stream restoration.
- It serves as a working model for other communities seeking innovative approaches to building climate resiliency.

Another important feature of the Sands Creek project is how well it serves as a living classroom. Since completion of the project in 2016, FUDR has lead more than two dozen site tours educating a wide diversity of audiences on the multiple community benefits of the project. From U.S. Congressmen to local schoolchildren, the Sands Creek project is helping prepare the next generation of leaders for the challenges of protecting people, communities, and wildlife from the future impacts of climate change.



The berm at the edge of this field was removed, creating a more natural slope that will allow the creek to spread out over the floodplain during higher flows.



This roughened floodplain structure will slow down flood waters.



Crews placed logs and root wads at a number of locations to stabilize streambanks and provide fish habitat.

Funding for projects

- Incorporate climate considerations into existing projects; for example, when a road or culvert is already scheduled for replacement.
- Seek partners with shared interests in a particular location or stream and submit joint proposals for funding to stretch dollars further.
- Forested buffer or stream restoration projects on privately owned land may be candidates for Farm Bill cost share assistance.
- The Federal Emergency Management Agency (FEMA) has preventative Pre-Disaster Mitigation grants available as part of their Hazard Mitigation Assistance program.

Resources

A collection of useful publications and programs can be found at: <http://commonwatersfund.org/climate>.

Contacts

County Soil and Water Conservation Districts are a good starting point to connect with experts and partners to tackle flooding, streambank erosion, habitat, and other resource-related issues.

In the upper half of the Delaware River Basin:

New Jersey

Sussex County, Newton, NJ: (973) 579-5074

Warren County, Hackettstown, NJ: (908) 852-2579

New York

Sullivan County, Liberty, NY: (845) 292-6552 ext. 101

Delaware County, Walton, NY: (607) 865-7161

Pennsylvania

Wayne County, Honesdale, PA: (570) 253-0930

Pike County, Hawley, PA: (570) 226-8220

Monroe County, Stroudsburg, PA: (570) 629-3060

Other locations:

<http://www.nacdnet.org/general-resources/conservation-district-directory>



Gary Wilson, USDA Natural Resources Conservation Service

This streambank stabilization and planting project was funded through a NRCS Farm Bill program that provides cost-share funds for voluntary conservation projects on privately owned or managed land.



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