Case Study:
AUSABLE RIVER WATERSHED, NEW YORK

Challenge:

When Tropical Storm Irene made its way to upstate New York, the heavy rains it brought with it fell on to already saturated ground. With no place else to go, the stormwater overwhelmed culverts and washed out roads throughout upstate New York and Vermont. With predictions of increased frequency of severe storms and higher precipitation in the future, the impacts of Tropical Storm Irene highlighted the need of a redesign for many of the culverts in the region.

Credit: Jacob Mecklenborg

History

The Ausable River and its watershed are located in Northeast New York. The watershed has a population of 20,000 residents distributed among seven towns, eight hamlets and one incorporated village. Although the watershed is rural, it has a history of industry. Mining of iron and eventually logging in the area resulted in the establishment of the communities along the streams and rivers and roads throughout the watershed that connected these communities. The industry died off in the late 19th century, but the communities live on today, and the roads that connect these communities require culverts and bridges to traverse the 70 tributaries in the watershed.

When they were first designed, the culverts that made travel possible through the region were engineered to support roads, but did not take into consideration the increased water flow that occurs during heavy rain events nor the potential that narrow openings could be clogged by logs, rocks and other debris during a storm event.

When high volumes of water are forced through these narrow openings they increase the velocity of the water and erode the sediment in the stream bed. Also, if a culvert is blocked or restricted because of debris, it can cause the level of the stream to rise, resulting in flooding on surrounding properties, damage to the culvert, and potentially even washing-out roads entirely.

The undersized culverts also damage habitat and affect fish. The brook trout, an important recreational fish that draws tourists to the area, can be especially impacted by the fragmented habitat created by culverts. During times of average water flow, the depth of the stream in these culverts is too shallow for fish to pass through.

Project Details

- **Location:** Ausable River Watershed, Adirondacks Region, New York
- **Population:** 20,000 (within the watershed)
- **Strategies:** Flood friendly culverts
- **Cost:** $1M Total
- **Benefits:** Reduced Flood Damages, Ecosystem Restoration, Water Quality, Fish Movement, Recreation

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Sometimes erosion of the stream bed is so severe that the opening of the culvert is above the water level, making it impossible for fish to enter the culvert, which can trout off from important feeding or breeding ground farther upstream.

Solution

The Ausable River Association partnered with The Nature Conservancy and SUNY-Plattsburgh to identify which culverts should be prioritized to be replaced. They developed a model that looks at the potential social and economic impact of each culvert if it were damaged by flooding, as well as the culvert's impact on the ecosystem and its inhabitants. Dozens of culverts were identified, but three with the highest priority were chosen to be replaced, and two others were retrofitted. The effort served as a pilot project with a vision for larger-scale replacement in the near future.

Funding and Cost

The funding for these projects came from a grants secured by The Nature Conservancy that provided $845,000. The grants came from the Wildlife Conservation Society's Climate Adaptation Fund and the U.S. Department of Interior's Hurricane Sandy Coastal Resilience Competitive Grant Program. The costs for the projects in North Elba were $325,000 for the new culvert on Holcomb Brook and $335,000 for the culvert on Roaring Brook. The new culvert in Wilmington was smaller and had a cost of $60,000, plus the labor provided by the city employees. The Wilmington Culvert also received funding from the New York Department of State Environmental Protection fund, which paid for the engineering of the culvert. The projects were implemented with a cost-share program — The Nature Conservancy provided funding for half of each project and Essex County provided the rest of the needed funds.

Benefits

The new culverts will allow for higher flows of water during storm events that will reduce the likelihood of damage to surrounding property. The increased area for water under the road will ensure the water does not flow over the road and cause wash-outs that cut off access that affects people's commutes as well as emergency responses during floods.

The reduced damage to roads reduces the costs of repairs and allows communities to save money that would usually be spent of maintenance. The larger culverts also require less maintenance as they do not need to be cleaned out or unclogged. Although these new culverts cost more upfront, they last up to four times longer than the old culverts. The new culverts are expected to have lifespans of 100 years, significantly longer than the 25-year lifespan of the old culvert design. This longevity combined with the lower maintenance cost means the new culverts will be more affordable in the long term.

Finally, wildlife will benefit from the new culverts. The natural bottom of the culverts creates habitat for organisms that live in the stream, and the rocks create naturally deeper pools that brook trout can use to migrate up the stream. The new culverts connected 65 miles of fragmented habitat. Brook trout need the connected habitats to migrate for spawning and to seek out colder waters. Water in some parts of the watershed reach temperatures that are too warm for brook trout, and the reconnected streams allow brook trout to move to habitats that are more suitable to their survival. The improvements for brook trout also benefit the people of the community. Anglers love fishing for brook trout, and helping the trout will bring more anglers to the area, thereby benefitting local communities. The three new culverts and two retrofitted culverts will be used as demonstration projects that can be showcased to other communities interested in increasing resilience to flooding and improving stream habitat.

Naturally Resilient Communities is a partnership of the American Planning Association, the American Society of Civil Engineers, the Association of State Floodplain Managers, the National Association of Counties and The Nature Conservancy and made possible with support from the Kresge Foundation.