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ELDERBERRY AND BEYOND: NEW OPTIONS FOR RIVER LANDS IN THE NORTHEAST

Riparian buffer plantings can reap rewards for nature *and* business.

By Liz Brownlee and Connor Stedman

Stan Ward springs into his greenhouse full of excitement, eager to show off elderberry cuttings. He's growing elderberry, Echinacea, and other perennial medicinals on his upland farm in central Vermont, but these elderberries are bound for lower ground. This year, he's planting them into one of three riparian buffer plantings along the Mad River, continuing a project that began in 2012. The elderberry will absorb floodwaters, keep farm field runoff out of the river, and reduce erosion. And, they will generate income as an agricultural enterprise.

The river's edge can be tense territory, where conservation and agriculture seem permanently in conflict. Farmers, working with razor-thin profit margins, want the rich soils in production. Conservationists want floodplains to grow native ecosystems that absorb floodwaters, remediate pollution, and provide wildlife habitat. At the same time, the river's edge can also be a place of great collaboration. Stan's plantings are innovative, in part, because he's establishing them in partnership with his local watershed group and the local conservation district.

Elderberry cuttings at Stan Ward's Vermont farm. Photo by Liz Brownlee.

Planting elderberry in the buffer creates what Stan calls a "win-win-win" for watershed health, wildlife conservation, and the local farm economy. Stan isn't the only one interested. A small but growing number of farmers, conservationists, and land managers in Vermont are beginning to add productive buffers to their toolboxes. Farmers are planting on commercial and homestead scales across the state. By directly integrating agriculture and conservation, these working buffers could help farms and watersheds alike adapt to increased flooding and the new climate "normal" of the 21st century.

Rivers, Flooding, and Tropical Storm Irene

River channels support an extraordinary abundance of life. Water continually shifts and meanders, carving banks and revealing new land. On any summer evening turtles bask on gravel bars while swallows and kingfishers nest in steep exposed banks. These habitat features are found nowhere else in the wider landscape, and are constantly changing as the river moves. When rivers flood from snowmelt or storms, they deposit rich silt and sand in their floodplains, supporting riparian forests and riverbank meadows. These in turn provide food and shelter for countless wildlife species.

For farmers, rivers are a blessing and curse. They provide extremely fertile and easily plowed agricultural soils, but the threat of damaging floods is ever-¬present and increasing with climate change. In late August 2011, Tropical Storm Irene dumped 4-8 inches of rain throughout Vermont in less than 24 hours.

Flooding eroded entire fields, carried away barns, livestock, and greenhouses, and buried crops in sand and gravel. Almost 15,000 acres of Vermont farmland sustained damage; farmers in the state lost at least $20 million in one day.

Intact riparian landscapes can mitigate the impacts of flooding. Flooding along the Otter Creek from Irene impacted 92 farmers in the vicinity of Rutland, Vermont. Thirty miles downstream, in Middlebury, only 41 farmers reported damage. While crop damage was similar in both places, farmland impacts were not: the flood damaged only 60 acres of land in the Middlebury area, compared to over 4,000 acres surrounding Rutland. The difference lies, in part, in a large system of intact swamps, wetlands, and floodplain buffers along the Otter Creek between Rutland and Middlebury. These ecosystems slowed and absorbed the floodwaters, shielding many Middlebury farms from the worst of the storm's effects.

Riparian Buffers in the Working Landscape

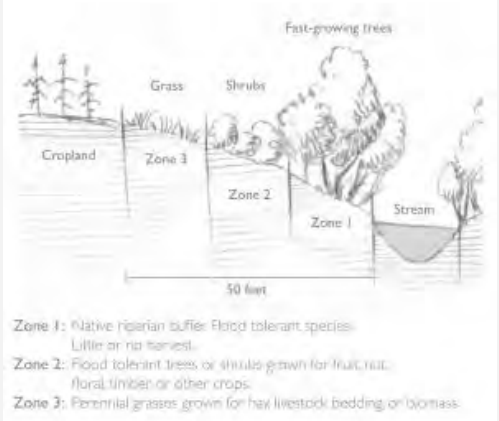
The physical features of riverbeds continually change with cycles of flooding. Photo by Connor Stedman.

Riparian buffers retain strips of natural vegetation along riverbanks, generally 20 to 50 feet wide. They mimic larger riparian ecosystems, like the ones that protected Middlebury during Irene, and allow natural river processes and communities of life adapted to floodplains to continue within agricultural landscapes. Buffers improve water quality, in particular, by acting as giant filters. High levels of nitrogen and phosphorus in agricultural runoff can disrupt river food webs and cause algae blooms. The trees, shrubs, and perennial herbs and grasses in riparian buffers slow overland water movement, allowing sediments and nutrients to deposit into the soil and keeping pollutants out of waterways. The root systems of these riparian plants, adapted to frequent flooding, rapidly absorb excess nutrients and make use of what would otherwise be waste. Buffers are essential for swimming, migratory fish breeding, and other river functions that depend on water quality.

A host of government and local programs encourage farmers to plant riparian buffers, but many farmers choose not to participate. Some farmers simply can't afford to take any land out of production. Others don't want to see productive land sit "idle". Often, farmers simply don't want to sign on the government's dotted line. They want to manage their land independently, and state and federal buffer planting programs often require contracts and include usage restrictions. Local programs may only require a handshake agreement, but even in those cases planting the river's edge with trees restricts farmers' options. Some dislike the aesthetic of a brambly forest hiding the river from view. For these reasons and many others, farmers often avoid or flatly reject planting riparian buffers on their land.

But a new idea is showing up on Vermont riverbanks, a system that brings farmers back to the table. Growing agriculturally productive buffers is a strategy that can make sense for both farmers and conservationists.

Agriculturally Productive Buffers: An Emerging Option



Agriculturally productive buffers generate ecosystem services and produce perennial crops. Illustration by Kelly Finan.

Agriculturally productive buffers (APBs) are a form of agroforestry, integrating forest management with agricultural production. They incorporate the essential elements of traditional riparian buffers, but also include perennial crop systems. Typically, the portion of the APB nearest to the riverbank, Zone 1 (see diagram), is restored as natural riparian forest. Zone 2 is an alley of flood tolerant shrub or small tree crops, such as elderberries, hazelnuts, or fencepost black locusts. Finally, the field-side Zone 3 grows late-cut hay, keeping perennial grass cover during the spring and late fall flooding season. Productive buffers provide flood¬ resistant agricultural enterprises while incorporating natural river processes into farmland: flood tolerance, deeply taprooted trees, year-round plant cover, and room

for river meanders.

Agriculturally productive buffers may overcome the obstacles preventing farmers from participating in the current buffer planting programs. These buffers keep farmland in production and help farmers take care of both their land and their bottom line. There are no government contracts and no paperwork, though some groups are working to establish local funding sources and best management practices. It's also clear that many details of productive buffer systems will need to be learned over time. In a changing climate and economy, this flexibility and adaptation may well be critical.

Collaborating is proving key to the success of productive buffer projects. Local nonprofits are helping Vermont farmers with logistics, and some are finding funding for planting strips of native floodplain trees within APBs. These collaborations are allowing farmers to grow much needed riparian buffers, increase flood resilience, improve water quality, create wildlife habitat, and grow crops. Crops currently planted as components of productive buffers in Vermont include nuts (hazelnuts, black walnuts) fruit (pears, currants, highbush cranberries), fenceposts (black locust), forage (late cut hay), and, of course, Stan Ward's elderberries.

Productive Buffers: Economics and Funding Sources

APBs can be funded through multiple sources, including crop revenue and certain riparian buffer grant programs. However, it is important to note that riparian buffers funded through CREP (the FSA's Conservation Reserve Enhancement Program) cannot include any harvesting or sale of agricultural or forest products. Some state and local funding sources may offer more flexibility. Upcoming trials in Vermont will evaluate the economics of a range of APB plantings, at commercial and smaller scales. These trials will help small farmers make informed decisions about APBs. If you'd like to learn more about APBs or current trial plantings, contact Liz Brownlee at ejbrownl@uvm.edu.

The Friends of the Mad River, a local conservation organization, partnered with Stan to establish his elderberry buffers. Caitrin Noel, FMR's Executive Director, is cautiously optimistic about the potential for productive riparian buffers to become more widely used on Vermont farms. "Working with Stan to create working buffers definitely requires more flexibility." She says that APBs can help reconcile ecosystem health and community values. "It makes buffers more palatable to farmers who hesitate to take the land out of production entirely. If managed properly, I think the model could represent the best of both worlds."

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