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AMERICA'S RIVERS AT RISK: CLIMATE CHANGE

With Each New Driveway, Runoff Swells

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DAHLONEGA, Ga. -- Peg Watkins has quite a view from her rustic contemporary home on a ridge top in the north Georgia mountains.

A luxuriant southern hardwood forest dimpled with hemlocks and rhododendrons overspreads the Etowah River Valley. From a vantage point on the back deck, the river splashes over Chuck Shoals 80 feet below.

Unfortunately, it's also a window on the effects of suburban sprawl.

"When we moved here in 1990, after a big rainstorm you couldn't see any difference in the river, except the water level - it was clear," Watkins said one recent day. "Six or eight years ago, after a big rainstorm you could see it cloud up, but then very quickly it cleared.

"Now after a big rainstorm it will cloud up and it doesn't get clear right away. It takes awhile."

The problem is tiny particles of soil and debris washing into the river from all the newly paved or soon-to-be-paved surfaces associated with new home and business construction.

Development along the scenic Etowah River is booming, as metropolitan Atlanta pushes north. In the westerly and central sections of this 165-mile-long river, whole neighborhoods of new homes appear suddenly, like mushrooms after rain. There are so many homes being built that in one 15-foot stretch of roadside along Route 20 there are signs advertising five competing developments.

This is quintessential suburban sprawl, which produces what engineers call "non-point source" pollution. It is a diffused pollution source, as rainwater or snowmelt washes over streets, parking lots and lawns, carrying with it a mix of debris and chemical pollutants such as spilled automotive fluids, all of it diluted and, without a view like Watkins has, too often overlooked.

Which is why a political solution to sprawl is so elusive, because its effects on rivers can be subtle, developing over years, and hard to get people worked up about. It is not an easily identifiable demon like a big factory pipe gushing toxic goo into a river. It is instead insidious and relentless.

Non-point source pollution has been going on for as long as there have been hard surfaces and drainage to a river. What is striking is how well it defies solution. Year after year it worsens water quality in thousands of miles of American rivers and streams.

Perhaps better than any other problem facing rivers today, sprawl demonstrates a fundamental truth about rivers: Their health reflects the treatment of the land that surrounds them.

Here, in the easternmost reaches of the Etowah, where the housing pressure is not quite as intense, yet, new retirement and second homes butt up against the river.

The Etowah is one of many such rivers in the country on the outer edge of an expanding metropolitan area with worsening water quality.

Damage Caused By Sprawl

Some river ecologists see sprawl as the single most damaging problem affecting American rivers. And it is one of the reasons that many scientists and environmentalists now think American rivers are in decline, after years of progress in the 1970s and '80s.

"We were on the upward track from the early to mid-1970s until the early to mid-1990s," said Rebecca R. Wodder, president of American Rivers, a national environmental group. "There were 20 years of good progress, things getting better and better. Sometime in the '90s, I can't tell you what day or which year, but there was a day when the negative trends overtook the positive trends."

There are some success stories in controlling sprawl. Natural or artificial filters trap pollutants running off paved areas in rainwater before they reach streams. New houses are clustered in one part of a development, leaving the rest for open space, as a way to keep impervious surfaces to a minimum. And streamside vegetative buffers, which serve as a kind of ecological shock absorber, are sometimes required.

Only last week, a multiyear, federally funded study of two subdivisions in Waterford, Conn., - one built in the traditional manner, the other built with minimal impervious surfaces and other runoff control features - demonstrated conclusively that the environmentally sensitive neighborhood dramatically reduced runoff pollution. In fact, runoff generated by the "green" subdivision "is similar to that generated by an undeveloped, forested parcel of land," according to the Connecticut Department of Environmental Protection.

But overall, progress is slow and spotty, while sprawl is rapid and rampant. Some of the trends in sprawl have made the problem even worse over the past decade.

"We're seeing a trend toward a large piece of land with a single-family home. Instead of putting 50 people in a 4-acre area, we're spreading those out over 20 or 25 acres. You're actually impacting more land than when you have denser development," said Margaret A. Palmer, an aquatic ecologist at the University of Maryland.

"The other thing is, we're abandoning some urban areas as people move from urban areas to suburban. So we have areas that actually are paved and built, perfect for people to live in, while we construct new areas for people to get out of the city."

The latest research is documenting just how damaging sprawl can be.

Two researchers at Drexel University, Luanne Y. Steffy and Susan S. Kilham, looked at Valley Creek, which runs through Valley Forge National Park in a part of Pennsylvania that became highly suburbanized only in the past 30 years. In areas of large-lot homes, they determined that "large amounts" of nitrogen, far more than people thought, were leaching from improperly operating septic systems and burdening the creek. Excessive amounts of nitrogen touch off aquatic growth that chokes lakes, ponds, rivers and streams.

Too often, Kilham said, homeowners pay no attention to septic systems unless they bubble up over the lawn - but all the while they could be silently spewing wastes into the nearest waterway through groundwater.

Scientists also are finding that as streams become more urbanized, the number of aquatic species declines.

What is lost is what ecologists refer to as functional redundancy. For any particular task in a stream, such as the insects that consume and break down excess organic matter such as leaves and twigs, there are often a number of species that perform it. As the number of species declines, there are fewer species to perform a task.

That creates a fragile system, the ecologists say, one that then must rely upon one or two remaining species to get the job done. Meanwhile, there is always the chance the remaining species could be wiped out by a new disease or an unusual event, such as prolonged drought.

"All of a sudden that function can't be performed at all," Palmer said. "Biodiversity is like ecological insurance."

With the increased paved surfaces that accompany sprawl, rainwater washes off the land more quickly, causing streams to rise rapidly, increasing the likelihood of flooding. At the same time, development often displaces vegetated land that helps retain water and protect streams from drought.

Palmer recently looked at urbanized streams with few trees at water's edge and found that as rainwater washed over hot sidewalks and paved areas and gushed into the streams, water temperatures shot up as much as 7 degrees in minutes.

"Imagine an organism or a fish trying to adjust to those changes," she said.

But research also suggests that there are effective measures that can be taken, even in highly urbanized areas, to reduce the damage.

Palmer and colleagues studied 29 small streams north of Washington, D.C., in Montgomery County, Md., where development has exploded over the past 50 years.

Streams with substantial and intact forests along their banks had greater numbers of invertebrate species such as mayflies and caddisflies - organisms that are food for other species, including trout - than streams without a buffer. Even streams passing through farmland, which also can degrade streams, showed higher levels of invertebrates.

This is significant, because some researchers have questioned whether it is worth it to even try to mitigate the impacts of sprawl in heavily urbanized areas.

"Even in watersheds with a lot of impervious cover," if a streamside buffer is retained, "it has benefits," Palmer said.

An Attempt To Minimize Impact

So far, the Etowah in its upper reaches remains largely scenic and comparatively clean, despite a long history of human use and abuse. It was in the upper reaches of the Etowah in the 19th century that America experienced its first gold rush, with the inevitable river degradation that accompanies such mining. Even with the mining, however, the Etowah remains extraordinarily rich in diverse fish and other aquatic species - though many of those species are faring poorly.

In "Aquatic Fauna in Peril: The Southeastern Perspective," four scientists writing about the Etowah said the river "has more imperiled fishes and invertebrates than any other river system of similar length in the southeastern United States."

In all, there are 105 fish species, 91 of them native, including the Etowah darter and the amber darter, both endangered species. And there are eight mussel species classified as endangered.

Those endangered species are the driving force behind an innovative program involving the federal government, the state and communities all along the river. The Etowah Regional Habitat Conservation Plan grew out of two realities: Sprawl is degrading Etowah habitat, and it is against the law to degrade the habitat of endangered species. If sprawl continues, federal law could force individual developers to prepare costly and time-consuming assessments of any project's impact on the river.

Instead, scientists, planners, political leaders, lawyers and others are developing a series of policies intended to help communities minimize development impacts through such measures as retaining substantial forested buffers along the river and minimizing impervious surfaces in developments. If it works, it may have implications elsewhere.

"Whatever we can do in the Etowah basin we think is going to be transferable throughout the eastern United States," said Mary Freeman, a research ecologist with the U.S.

Geological Service who is involved in the project. "How do you accommodate all the needs people have without losing resources?"

Improving Controls

On a recent day, Curt D. Gervich, outreach coordinator for the habitat conservation project, paddled a kayak in the upper reaches of the Etowah, where great blue herons and kingfishers attested to abundant aquatic life. The sun sparkled in the riffles and rapids. Was this really a river in trouble?

"You get in sections like this where it is just gorgeous, rhododendrons everywhere, and hemlocks, and you can't see anything but trees and cliffs along the river," Gervich said. "You wouldn't know there is a threat. But you have this monster of storm water management and erosion that is happening 500 yards through the woods. And you've got highways cutting through the woods left and right that you just can't see."

Until recent years, it was possible in some counties to build right up to river's edge, and there are homes, even in the upper Etowah, that in fact overhang the river. Controls are improving, Gervich said, though much remains to be done.

Even now, in many cases, "they are not enforcing erosion control as strongly as they should be," he said.

And that is how it is with sprawl. Don't enforce an erosion control ordinance here, and allow construction on the river bank over there. Meanwhile, as the number of homes in the river valley grows, one here, five there, and as the amount of paved surface increases, each house, each driveway contributes to a decline in water quality, however unspectacular. But in total, the impact can be huge.

Peg Watkins knows this. Her house, built in 1989, is 80 feet from the river, with a heavily forested protective buffer between her home and the water. But she still counts herself as part of the problem, even though she cares dearly about the river.

Yes, land use controls should be stricter, she says, and people could be more vigilant in creating and maintaining erosion control plantings and devices. All kinds of things should and could be done.

Still, she said, "Everybody thinks it is somebody else. But it is really all of us."