

What's in that Water, Anyway?

Pinpointing
where all the
nitrogen comes from

Notable notes in forest research at Oregon State University College of Forestry



Near the beginning of the Calapooia River, in the forests of the Oregon Cascades, kayakers bob along. After a few miles, the boaters pull out. The river, though, goes on. Leaving the mountains, it flows through forested foothills, agricultural fields, and small towns. At Albany, it joins the Willamette River. As it goes, it takes on new riders—organic nitrogen, and nitrogen-containing chemicals called nitrate and ammonium. And the kayaker coming down the river now might be Bill Floyd, a graduate student in forest engineering. Instead of thrilling to white water, he's sampling the water all along the way.

What's he trying to find out? He and his major professor, Stephen Schoenholtz, want to pinpoint where all that nitrogen is coming from. The Calapooia is a relatively small tributary of the Willamette, but it dumps more nitrate into its waters than do most of the other tributaries. Nitrate encourages algal growth, which can adversely affect native fish. If it's in drinking water at high concentrations, nitrate interferes with oxygen transport in blood. This can even be fatal to babies. Measuring how much there is of each form of nitrogen at a given place is also important in understanding the system.

"Water is the circulatory system of the ecosystem," says Schoenholtz. "The water reflects the geology, vegetation, and use of the land through which it's flowing, just as your blood reflects the health of your body. We're trying to pull together information about water quality from the whole watershed. We expect that the nitrogen content of the river at different places will tell us what the land along the river is being used for."

Their work is very challenging. This type of research has rarely been done, so innovation is the name of their game. It is also very complex. In addition to river flow and water characteristics, they must map land use and vegetation through the entire river basin and the entire year. When the data are all in, they will build computer models. Ultimately, they will determine the spatial scale that provides the strongest relationship between land use, the vegetation on the land (e.g., trees, shrubs, or crops) and dissolved nitrogen.

Both Schoenholtz and Floyd bring a background in biology and ecology to their current work in hydrology, soil science, and ecosystem sustainability. Other scientists working on this project study birds, fish, and large invertebrates. Combining their different areas of expertise, they're developing conservation practices to protect the quality of natural resources and to find out how well those practices are working.

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