



The Secret Life of Water

Where does water go when it rains?

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



Where does water go when it rains? How long does it take to get there? How does it flow to get where it's going? Those are three of the big questions for Jeff McDonnell, a professor in Forest Engineering, and his Hillslope and Watershed Hydrology research group. "We can measure rainfall," says McDonnell, "and we can measure streamflow. In between is a black box. We don't know much about what's going on there."

Finding the answers inside that black box is critical. Where the water goes as it travels through watersheds determines its chemistry and sediment load. How it accumulates in the soil affects the possibility of landslides. So McDonnell and his group are asking these questions in watersheds near and far—from the MacDonald Forest near Corvallis to the Maimai watershed in New Zealand, on every continent but Antarctica.

Eventually, the water ends up in streams. What's been surprising for McDonnell and his colleagues worldwide is how long it takes to get there. Using isotope tracers, McDonnell and his group have discovered that flooding streams and the waterfalls that cascade from cliffs and roadcuts after a heavy rain are made up largely of water that's been lurking underground for months, even years. Hydrologists must now drastically rethink their models and assumptions. "Current models of watershed hydrology need a massive overhaul if we're going to understand land-use impacts," says McDonnell. "We need models that are demonstrably realistic and work for the right reasons."

McDonnell's newest projects are concerned with land-use effects on water quantity and quality. He is contrasting water cycling in dry watersheds in eastern Washington with the hillslope and watershed hydrology of extremely wet places such as the Maybeso watershed in SE Alaska. He's also studying land-use effects close to home in the College of Forestry's MacDonald-Dunn Forest, where forest, agriculture, and urban development meet. His many other projects all over the world keep him on the go. Fortunately, he loves to travel!

In addition to his love of travel and an equally great love of the outdoors, McDonnell's background in geophysics and earth science underpin his work as a hydrologist. He points out, however, that hydrologists come from many disciplines—engineering, for example. They have one thing in common: they like to go with the flow.

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