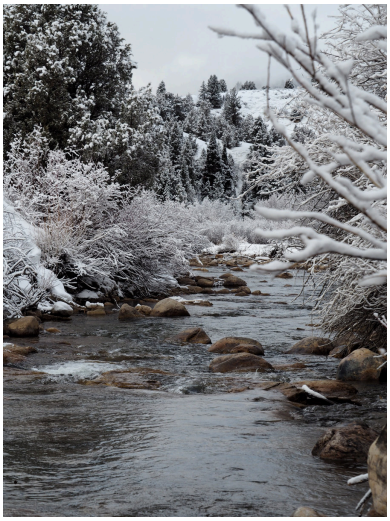
USU Researchers Study Unique Groundwater Pathways in Logan Canyon | College of Engineering

04/05/2021

New Release — Apr. 5, 2021 — For those who live in snowy mountainous regions like the Wasatch Front, much of the water used for irrigation and drinking comes from snow that accumulates in the mountains. This snow melts each spring, replenishing groundwater that feeds rivers and streams. In the Logan River basin, this yearly snowmelt fills up the groundwater stores that includes a complex network of pipes and cave-like reservoirs, a unique geologic feature called “karst.”



Bethany Neilson and three other researchers have been collectively awarded more than $700,000 from the NSF to study the Logan River watershed given its mountainous, snowmelt-fed, karst groundwater system.

To winter sports enthusiasts, lighter snowfall might mean fewer skiing weekends. But for water researchers, it could mean reduced groundwater stores and potentially dry rivers. And since snowfall varies from year to year and snow accumulation will likely decrease in the future, water managers and users will have to face tough choices.

“We are highly dependent on the water from the Logan River watershed,” said Bethany Neilson, professor of civil and environmental engineering. “Even with our current snow accumulation, in dry years we divert all the water in the river, and there are periods when river sections are dry. The amount of water we get each year to meet our irrigation and drinking water needs is completely dependent on how much snow we get in the mountains.”

Neilson and three other researchers — Dennis Newell of USU’s Department of Geosciences, Tianfang Xu at ASU, and Jim McNamara at Boise State — have been collectively awarded more than $700,000 from the National Science Foundation to study the Logan River watershed given its mountainous, snowmelt-fed, karst groundwater system. Their primary objective is to develop models that will establish connections between snowpack variability and the amount of groundwater and streamflow available for use. These tools will allow researchers to also anticipate how water availability might change under future climate conditions, including persistent drought.

Xu will lead the development of these new approaches, using AI and deep-learning modeling to connect snowmelt to groundwater storage and eventually to how much water is in the river. Neilson, Newell, and McNamara will focus on collecting hydrologic and geochemical data to understand how different parts of the watershed are connected and to test and interpret these models. The project will rely on data provided as part of the Logan River Observatory.

“The Logan River Observatory is an important part of this research” said Neilson, “because we have dense data sets for the Logan River that span from Franklin Basin, through the canyon, to the Utah Water Research Laboratory. We also have weather data at multiple locations in the canyon. These data are going to be critical to the success of this project and our ability to inform future water management.”

Neilson hopes this research will improve both local and statewide understanding of the year-to-year and future water availability for similar settings throughout the state. She also anticipates that the modeling methods developed will be sophisticated enough for use in watersheds in similar regions throughout the world.

###

Contact: Dr. Bethany Neilson, bethany.neilson@usu.edu, 435-797-7369

Writer: Anessa Pennington, anessa.pennington@usu.edu, 435-797-7512