



Working together for a healthy Elbow River Watershed

Eyes on the Elbow

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Protecting Groundwater is Key to Elbow River Health

By Ann Sullivan

The Elbow River may be the only river in the world whose major end use is drinking water. And although it supplies water to about half the population of Calgary and one in six Albertans, it's not a big river, just one-tenth the size of the Bow. Cathy Ryan, a professor in the Department of Geoscience at the University of Calgary, makes these points to illustrate how important it is to protect the Elbow and its aquifer. Since the aquifer is directly hydraulically connected to the river, Ryan said, any river activities can directly affect water quality. Ryan is concerned that the Elbow is not being adequately protected because it's "a casualty to the fact that people want to live close to rivers."

Much of the flow in the Elbow River moves through the aquifer to the river, either after percolating down through the aquifer itself or through rocks, cracks and soil before flowing into the aquifer and then the open-stream river. Surface water, which comes directly from rain and snowmelt, makes up a much smaller percentage of water in the Elbow.



*Rae Glacier - source of the Elbow River in Kananaskis Country
Photo by Robert Lee*

In southern Alberta, surface water has been fully allocated (through water licences), which means we increasingly rely on our supply of groundwater, something we can't see and haven't

been able to accurately measure. That's why research by people like Éowyn Campbell, a doctoral student working with Ryan at the University of Calgary, is so important. Campbell, whose research on the age of water in the Elbow was featured in a previous ERWP article (<https://erwp.org/index.php/feature-articles/203-research-helps-identify-sources-of-old-water-in-the-elbow-river>), says that virtually all water in the Elbow River is groundwater. "This is profound for our understanding of the river," she said. "Anything we do upstream is going to impact the amount and quality of the water we're seeing [downstream]."

As the population in southern Alberta increases and climate change continues, it becomes even more important that we understand groundwater in the Elbow River – the quantity and quality of it as well as our impact on it and how we can protect it.

Groundwater is contained in the Elbow River's alluvial aquifer, an area that extends up to 2 kilometres outward from the river and from 5 to 12 metres down. The amount of groundwater stored in the aquifer depends on the amount of recharge (water gained through rain and snowmelt) and discharge (water released from the rock into the river or pumped out through wells). Ideally, recharge and discharge amounts balance out over the long term.

Development on the aquifer affects water use and storage. Before scientists really understood the connection between rivers and aquifers, communities were built very close to the river with little concern for groundwater. A number of populated areas – including Bragg Creek, Redwood Meadows, Elbow Valley and parts of Springbank and Calgary – sit squarely in the Elbow River aquifer. And even though we now have a better understanding of the need to protect our aquifers, riverside development continues.

A proposed new development along Highway 8 west of Elbow Valley could add 7,000 housing units and close to 19,000 residents in a 930-hectare area south of the Elbow River. Can the Elbow sustain more people? Campbell believes the river can support more people than it currently does, but only with careful management. "In my opinion," she said in an email, "maintaining the quality of the water in the river (and aquifer) requires treating it as a park, maintaining a 2-km setback from the river for **any**

development, with more intensive developments set outside the alluvial aquifer entirely."

Ryan says that the Elbow River has shown a steady water quality decline over decades (first reported in 1999 by Al Sosiak and reinforced in 2005 by Jamie Dixon and Al Sosiak). She and Campbell agree that people's desire for waterfront living exacerbates the problem. "Unfortunately, human beings like to live right beside the water," Campbell said. "We create our own problems."

Ryan agrees. "Somehow, the land use on the Elbow River aquifer should be protected to activities that don't contribute to groundwater quality degradation, discharge effluent to the river, and aren't susceptible to flooding."

Since 2007, the Rocky View Well Watch program (RVWW) has been monitoring water levels in more than 30 wells across Rocky View County. Volunteer citizen scientists measure the water level in their wells and enter data through a web-based portal. According to Masaski Hayashi,

Éowyn Campbell is a doctoral student in the Department of Geoscience at the University of Calgary and a contributing member of the ERWP's State of the Watershed Report team.

Cathy Ryan is a professor in the Department of Geoscience at the University of Calgary with a long history of groundwater research.