The Record (Kitchener, Cambridge And Waterloo)

Problems ahead for Canada's water supply

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Study conclusion: Reliable knowledge of our cold regions water resources is necessary for natural resource development and environmental conservation.

With recent reports of greater snowfall, melting glaciers and thawing permafrost, Canada's cold regions are changing.

That means problems for Canada's water supply, infrastructure, ecosystem health and climate.

Researcher: Bill Quinton is an associate professor of geography and environmental studies at Wilfrid Laurier University's Cold Regions Research Centre, and a member of the IP3 Research Network.

Study Focus: "Our inability to predict hydrological events in Canada has damaged communities and disrupted the economy," Quinton said.

Examples are the Red River and Saguenay River floods; droughts in the Prairies and British Columbia Interior; ice storms in Ontario, Quebec and Atlantic Canada, and most recently, low water levels in the Great Lakes.

"In Canada's cold regions such as the north and western cordillera, the warming climate has depleted the snowpack and ice cover, which results in increasing ground thaw during the summer months, and shifting rainfall and snowfall patterns," Quinton said.

"Few people realize how closely Canada's cold regions are connected to the rest of the country."

Quinton's research focuses on advancing our understanding of, and ability to predict land surface hydrological processes and water flows in cold regions, and how they're likely to change with a warming climate.

His recent field study took place in the southern Northwest Territories near Fort Simpson.

That area is characterized by a mixture of boreal forest, a large coverage of open water and wetlands, and discontinuous permafrost.

Quinton examined aerial photographs and satellite imagery.

He found that the area occupied by permafrost had declined dramatically over the last half century; in some areas by more than 30 per cent. This change produced a corresponding decrease in forest cover, and corresponding increase in the coverage of bogs.

"Our earlier studies in this region showed that bogs produce very little runoff as they store most of the water they receive from rainfall and snowmelt," Quinton said.

He also found that the decrease in tree cover reduced snow accumulation (an important source of runoff water in the spring) by increasing the frequency of blowing snow.

It also raised the rate of ground thaw by increasing the amount of direct radiation to the ground surface.

"Such a land-cover change shows the potential for declining stream flows in the future in this region," Quinton said.

"Compounding this is the concern that melting permafrost will allow more water to be absorbed into the soil rather than running off the ground's surface to streams and rivers."

Potentially, that means less surface water available for use by local communities or the industries, such as mining, oil and gas, that depend on it, he said.

It also makes less water available to supply northern wetlands, lakes and river systems which are home to important aquatic ecosystems and migratory bird populations.

Quinton's present studies are focused on developing and testing a new set of physically-based computational tools for estimating stream flows, which are sensitive to soil thaw rates, permafrost coverage and associated landscape changes.

These tools will lessen the uncertainty regarding the future availability of the surface water resource in Canada's cold regions.

Source: Wilfrid Laurier University public affairs.