

# Scientists try to gauge mountain water supplies

LYNN MARTEL CAM/DORF

"There's water in them thar hills, and scientists are diligently working and thinking up new ways to measure, estimate and predict just how much water is stored in the mountain landscape.

More than 60 scientists, along with consultants and representatives of utility and power companies, non-profit organizations and provincial and federal governments, gathered at the Radisson Hotel and Conference Centre last week to share information and ideas about how to determine how much water is stored in Canada's cold weather regions. They were participants at a workshop hosted by the Canmore-based Western Watersheds Climate Research Collaborative titled IP3: Prediction of Water Resources in Mountain and Northern Canada.

Funded by the Canadian Foundation for Climate and Atmospheric Sciences from 2006 through 2010, and headquartered at the University of Saskatchewan's Centre for Hydrology, IP3 is a network consisting of several dozen investigators and collaborators from across Canada, the U.S. and Europe. The acronym IP3 stands for Improved Processes and Parameterization for Prediction in Cold Regions.

Those cold regions, explained IP3 manager Julie Friddell, consist of high latitudes and high altitudes – Canada's north and its mountains – and the work of IP3 is to enhance the understanding of water in cold weather regions.

"We're working toward figuring out how to build infrastructure that handles water in the most efficient way," Friddell said.

Studies are currently underway to determine what's happening in terms of annual flow and peak discharge, Friddell said, and what water is being used on its journey from the Rockies to the Prairies.

The processes in IP3 involve studying the actual hydrology on the ground, as is currently being carried out at Lake

O'Hara, Peyto Glacier, Marmot Creek in Kananaskis Country and several locations in the Yukon and Northwest Territories.

Parameterization is the result of taking information from the ground, putting it into computers and creating equations from the observations, a process that doesn't come without challenges, Friddell said.

"We're trying to maintain the complexity of the systems using the most simple computer systems possible, and that's not always easy," she said.

The predictions in IP3 involve creating models for weather prediction and forecasting.

Studying snow on the ground means taking into account the accumulation, redistribution by wind and the amounts trapped in vegetation, including the forest canopy, said John Pomeroy, Canadian research chair in water resources and climate change and IP3 project lead.

One inadvertent discovery as a result of measuring snow in the forest canopy has been increased knowledge about the effects of the pine beetle infestation – bare, dead trees radiate more heat than live ones.

Measuring the snowpack to determine how much water it will provide as it melts is not a simple task, Pomeroy said.

"We want to get the melt rate right, that'll give us the first flux of water into the streams," he said. "We want to do that on a simple snowpack, but real snowpacks aren't that simple. It's not a simple thing to calculate. What we can do is study small areas of land. And if we are going to study places like Peyto Glacier we have to know detailed topography to factor in things like hot rock radiation."

For scientists, Pomeroy said, this time in history is particularly interesting as our climate changes and government and policy makers begin to look for ways to prepare for and meet those changes.

"It's an interesting time in history because it's the first time in Canada that

we want to use more water than we have available, and we want to use this water that comes out of the crown jewels of Canada's ecosystems," Pomeroy said.

The water that is stored in the glaciers of the Canadian Rockies flows to three oceans – the Atlantic via the Saskatchewan and Nelson Rivers; the Pacific via the Columbia River; and the Arctic via the waters of the Athabasca and Mackenzie Rivers. And the water that flows through the Bow Valley via the Bow River ultimately provides much of the water crucial to homes and farms in Canada's prairie provinces.

Managing what we have and gaining

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a better understanding of what we'll have in the future is a crucial task. Pomeroy said.

"Many societies have failed to manage their water well, and have collapsed as a result," Pomeroy said. "The southwestern U.S. is heading for almost certain economic and ecological disaster. The Colorado already can't manage drought. We've had droughts before in that region that have wiped out tribes. When people first started living on Easter Island, it was covered with trees. They cut them all down to move the stones for their religious statues. Someone in that society must have stood on a hill and said, 'hey, that's the last tree.' And they still cut it down. By the time the Europeans arrived, they were impoverished and no longer a functioning society. They had no wood for homes or for boats – they couldn't even leave."

The purpose of this conference is to discuss the most efficient ways to manage one of mankind's most fundamental resources, water.

"We're excited here (this conference), because we have enough warning from other places like the southwest US, and we're developing water science technology to a point that if Canada chooses to avert disaster, we can do it."