



Metro Vancouver's last glacier: Drip by drip, a massive sheet of ice disappears

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By Glenn Bohn

Two centuries ago, when the West Coast had a cooler climate during the Little Ice Age, there were about 10 glaciers in the mountains north of Metro Vancouver.

Now, only the Coquitlam Glacier remains.

It's the only mass of land ice in Metro's three watersheds – the snow-blanketed mountains, forested valleys and vast reservoirs that encompass almost 600 square kilometres of land and fresh water. And the Coquitlam Glacier is thinning and shrinking, like other so-called "permanent glaciers" in North America and around the planet, as average annual temperatures climb.

The barren granite peaks and ice-carved alpine valleys around that glacier seem as remote and wild as the Arctic tundra.

Metro Vancouver geoscientist Dave Dunkley is one of the few people who have had the privilege of visiting that difficult-to-reach glacier in the restricted-access watershed.

He goes there, in a Metro-chartered chopper, to study the glacier and map its relentless retreat.

"This is the last glacier in our watersheds," Dunkley said over the intercom as the chopper swept across the barrens and hovered over the fractured ice.

"It's a symbol of climate change. We really have to take stock and change our ways. We're going to be forced to conserve our water. Are we going to raise our dams? Are we going to get more efficient with our water? We may lose plant and animal species as a result of our ways."

To the untrained eye, glaciers seem as permanent and unchanging as the hardest rocks on the planet.

They are not.

If the climate warms, the glacier loses some of its mass each summer and starts to thin and shrink.

Scientists use different techniques to measure year-to-year changes. Some with mountaineering skills put teeth-like crampons on their hiking boots to reach the dangerous crevices or cracks on a glacier's face. The thickness of each snow layer is one measure, like the annual growth rings on a tree.

During a helicopter trip to the Coquitlam Glacier in late summer, Dunkley brought a wood-boring tool to date one of the Mountain Hemlock trees that had established near the terminal moraine or furthest extent of the glacier.

The terminal moraine – an arc of rocks and boulders left behind by the glacier at its peak size – is about 700 metres from the much smaller Coquitlam Glacier that exists today.

After scrambling up some rocks and bushwhacking his way to the tree, Dunkley slowly screwed the tool through the bark, into the heart or centre of the tree. The tree wasn't as large as many of the trees in Metro Vancouver suburban yard, but the high-elevation tree had survived many long harsh winters and short summers. After a lot of grunting, he took out pencil-shaped core sample of wood. He estimated the short and slow-growing tree was about 200 years old, but noted that harsh growing conditions at that high elevation could mean that 50 years passed before the first seedlings survived and grew into trees. That suggests the glacier might have disappeared from that spot in the mid-1700s – long before Captain George Vancouver sailed into Burrard Inlet in 1792 and Simon Fraser canoed down the great river that now bears his name.

From that tree, Dunkley walked several hundred metres up to the glacier. He crossed a muddy expanse, carpeted with alpine plants and dotted with bear tracks, to the smaller glacier that exists today.

A large stream of ice-cold and silt-laden water gushed out of the glacier's toe, heading downhill to the glacier-made valley bottom that bears had crossed.

Dunkley pointed to the blue-coloured crevices in glacier. The hues of blue are beautiful, but his trained eye saw the crevices as signs of decay. Every fracture in the glacier allows rain and snow melt into the glacier, to melt and erode more of its ice mass.

The Coquitlam Glacier is still huge: about 600 metres long, 300 metres wide and 50 metres thick. About eight billion litres of water are stored in that mass of ice. That's a lot of water, but it's just a seven-day water supply for the industries, businesses and homes in B.C. largest urban region.

“People from Metro Vancouver hear about glaciers receding all around the world,” Dunkley said. “But here's one in their watershed – the only one. If you live in the Coquitlam area, you're drinking glaciated water. You won't be in the future.”

Dunkley hesitated when asked to predict when the Coquitlam Glacier will disappear. He can't predict the future, of course, but speculates the glacier will be gone within 100 years.

The West Coast's relentless rains and snow-capped mountains still top up the Capilano, Seymour and Coquitlam reservoirs. There's still plenty of drinking water for the two-million-plus people who live in Metro Vancouver, especially if they don't waste it on their lawns during the summer.

But the long-term weather forecast suggests our West Coast climate will change significantly by the 2050s.

Governments around the world are working on climate adaptation plans because of the growing body of scientific studies that conclude man-made emissions of carbon dioxide and other greenhouse gases are changing the world's climate, just as the glass in a greenhouse trap's the sun's warmth in a greenhouse. Some of the most authoritative assessments are coming from the Intergovernmental Panel on Climate

Change, a scientific body set up the United Nations Environment Program and the World Meteorological Organization.

According to that international body of climate scientists, the warming the world has experienced over the last half century is without precedent, for at least the past 1,300 years.

The climate change modelling done by federal government departments predict these kinds of “climate events:”

- More intense rain storms, especially during winter and spring.
- More rain during fall, winter and spring.
- Higher summer temperatures, leading to more summer droughts and decreased stream flows in summer and fall.
- More landslides and debris torrents in steep and unstable terrain.
- Less snow in winter.

How could global warming change our watersheds? How might it affect our water reservoirs?

Metro Vancouver planning forester Derek Bonin said more rain and wind storms likely mean more silt will enter the reservoirs. But he also noted the region's new \$600 million Seymour-Capilano water project. The filtration plant, which should open in spring 2009, is designed to filter and purify silt-laden water. It will be the world's largest ultra-violet water treatment plant. And next year, construction work will begin on a new \$110 million ultraviolet disinfection facility to purify water from the Coquitlam reservoir.

But other challenges are on the horizon. If less snow falls during the cold months of the year, that means there less stored water in snow during the summer, when demand for tap water peaks. Water supply engineers know that water consumption will climb as the region's population grows. Global warming means the region will have to find new ways to store more water much earlier.

“Climate change scenarios basically speed up the clock,” Bonin said.

Metro Vancouver has three main reservoirs: the Capilano, Seymour and Coquitlam reservoirs. It also has three smaller alpine reservoirs: Burwell, Pallisade and Loch Lomond. All have small dams that hold back water. They also have “lake taps” – small tunnels, with pipes and valves, which release water from those alpine reservoirs when needed in summer. The alpine reservoirs were developed during the 1920s and 1930s. The big valley bottom reservoirs, like the one behind the Seymour Dam, were built decades later, in the 1950s and 1960s.

Now, in part because of global warming, Metro Vancouver is looking at ways to store more water in its restricted-access watersheds. Among the options: raise the height of the Seymour Dam and/or build new dams in the upper Seymour or Capilano valleys.

Metro Vancouver staff has also taken another look at the water storage capacity of yet-undeveloped alpine lakes. The lakes are deep granite bowls, carved out by glaciers. They look like small dots on a map but, collectively, they have the potential to store large volumes of water. Enchantment and Hanging lakes are two of the best candidates, but there are about 30 small lakes that could be dammed and turned into reservoirs.

“At a quick brush, we’re looking at, potentially, an additional 15 per cent for water storage, over what we currently have,” Bonin said.

“Over time, as our region keeps on growing, we’re going to need additional sources of water. So these small and incremental increases in storage capacity – when combined with new water conservation initiatives – will help minimize the pressure on our water supply system from climate change. If we’re successful, we can delay the day when we’ll have to build another large dam and flood a valley bottom.”

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