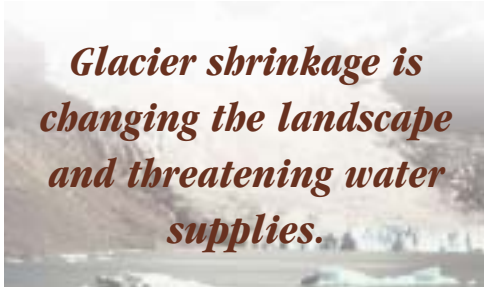


Glaciers are powerful tourist attractions, but they are also a significant source of water for many rivers and streams. They therefore have a great influence on stream flow and the things that depend on it, such as power generation, irrigation, municipal water supplies, fish and other forms of aquatic life, and recreation.

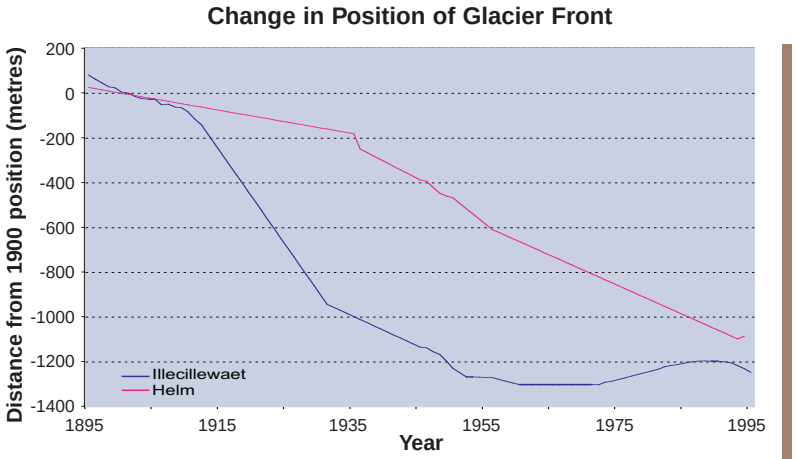
The total size of a glacier is closely linked to two climate-related phenomena: the amount of snow that falls on it in the winter and the amount of snow and ice lost to melting in the summer. Growth or shrinkage of the glacier eventually causes its front to advance or retreat, although the position of individual glacier fronts can change at different rates because of differences in the glaciers' elevation, length, speed of movement, and other factors.

Warmer temperatures increase the rate at which a glacier melts, and so does more rainfall. More snowfall, on the other hand, adds to a glacier's growth. In most areas, however, warmer temperatures are having a greater effect on glacier size than changes in either rain or snow.

FOCUS: British Columbia

Most of the glaciers and icefields in British Columbia have lost substantial amounts of ice over the twentieth century. The indicator presented here records what is happening to two mountain glaciers in different parts of southern B.C. – the Helm Glacier in Garibaldi Provincial Park north of Vancouver and the Illecillewaet Glacier in Glacier National Park near the Alberta border.

As the graph shows, both glaciers shrank by more than a kilometre between 1895 and 1995, although they have done so at different rates. The Helm Glacier has shrunk fairly steadily, but the Illecillewaet Glacier has changed more erratically, shrinking rapidly in the early part of the last century but then advancing in the 1970s and 1980s before staring to shrink again. The temporary growth was probably a result of a period of increased snowfall at higher elevations that offset the melting at lower levels.



Source: *Adapted from B.C. Ministry of Water, Land and Air Protection, 2002*

The graph plots the distance in metres between the positions of the glacier fronts in 1900 and their positions in other years. The minus values indicate that the glacier front has shrunk from its position in 1900.

Illecillewaet Glacier, 1999

THE BIGGER PICTURE

Since 1950, the greatest warming in Canada has occurred in the west and the northwest. Most glaciers in these regions are also shrinking rapidly. The 1300 or so glaciers on the eastern slopes of the Rockies, for example, are now about 25% to 75% smaller than they were in 1850. The area of warming also covers many of the High Arctic islands in Nunavut, where glaciers such as the Melville Island South Ice Cap have been shrinking gradually since at least the late 1950s. In eastern Nunavut, however, the situation is more complex: some glaciers are shrinking, while others are growing.

The melting of glaciers is a concern for Alberta, Saskatchewan, and Manitoba. Farmers depend on glacier-fed rivers like the Saskatchewan and the Bow for irrigation water, and cities like Edmonton, Calgary, and Saskatoon rely on them for municipal water supplies and recreation. At The Pas in Manitoba, reduced flows on the Saskatchewan could interfere with the native fishery and hydroelectric power generation.

Although the early stages of glacier shrinkage from melting are likely to increase the water supply to rivers, the flow of meltwater will eventually decrease as glaciers get smaller. The loss of water could be substantial. In a dry August, for example, about 25% of the water in the Bow is glacial. Recent evidence indicates that the amount of glacier water entering the Prairies' largest river, the Saskatchewan, has already begun to decrease.

What's happening in Canada is happening in other parts of the world. According to the World Resources Institute, the total size of the world's glaciers has decreased by about 12% during the twentieth century.

GLACIER FACTS

- Put them together in one place and Canada's 200,000 square kilometres of glaciers and icefields would cover an area about half the size of Newfoundland and Labrador. After Antarctica and Greenland, Canada has more glacier ice than any other part of the world.
- Meltwater from glaciers along the Alberta–B.C. border ends up in all three of Canada's oceans – the Pacific, the Arctic, and the Atlantic (through Hudson Bay).
- The Thompson glacier on Axel Heiberg Island in the Canadian High Arctic is growing while the neighbouring White glacier is shrinking. Both have been affected by earlier cooling and more recent warming, but the smaller White glacier has responded faster to the warming.
- Glaciers trap air, and all the chemicals in it, when they freeze. Air bubbles trapped in the ice are a valuable source of information about past climates and environments. More recently, glaciers have become a resting place for toxic chemicals deposited from the air. When the glaciers melt, these chemicals are released into rivers and lakes. Toxic chemicals that were once stored in the ice of Bow Glacier have now been detected in the waters of Bow Lake in Banff National Park.
- Alpine ice patches – mini-glaciers just a few hundred metres long or wide – are disappearing rapidly from Yukon mountain ridges. Their disappearance is producing a treasure trove of ancient human and animal artifacts. Because the ice is vanishing so rapidly, however, archaeologists are having trouble investigating all the new discoveries before the material decays or is disturbed.
- Wedgemount Glacier near the resort town of Whistler, B.C., has shrunk hundreds of metres in just the past two decades.

Source: *Adapted from Canadian Geographic, 1998, and National Atlas of Canada*

Areas with glaciers and ice caps, shown here in blue, are found in B.C., Alberta, Yukon, the Northwest Territories, and Nunavut.