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LIVING

Perfect storms

Snowstorms remind us of the frailty of our urban infrastructure and lifestyle, and how quickly nature can bring everything to a standstill

Terry Carpenter, special to The Examiner

OUR CHANGING SEASONS
Drew Monkman

Despite what we might say publicly, many people enjoy and even look forward to a major snowstorm. Maybe it's because there are relatively few times during the year when nature truly asserts herself and provides some real excitement. An atmosphere of anticipation prevails in the days and hours leading up to the storm as people share the latest forecasts and cancellations. For some, there is even the hope that the most severe forecasts will indeed come true and that we'll have a snowstorm to remember.

When the storm finally arrives, watching its fury can be great entertainment. It's even fun to go outside for a few minutes to embrace the storm's full force. Afterwards, a real camaraderie often emerges as neighbours give each other a hand in digging out.

Maybe the attraction of snowstorms has something to do with a need to reinforce our Canadian identity or to reassure ourselves that winter can still muster some real force, even in a time of climate change. But snowstorms also remind us of the frailty of our urban infrastructure and lifestyle, and how quickly nature can bring everything to a standstill.

When talking about winter weather in the Kawarthas, a logical starting point is our geographical location. We have the unique honour of being situated almost exactly half way between the North Pole and the Equator. We share our latitudinal location of approximately 44 degrees north with well known cities like Bordeaux, Bucharest and Monaco. We therefore see the sun climb to the same height above the horizon and share approximately the same length of day. However, the citizens of these other locales live in climates very different from our own.

Located in the middle latitudes, areas such as ours see a generally west-to-east movement of air. At the same time, we lie between the source areas of cold (polar) and warm (tropical) air masses. These air masses bring weather conditions created in the Arctic or over the Gulf of Mexico and transport them — almost literally — into our backyards. In summer, these might be the hot, muggy conditions developed in the air mass while it was sitting over the West Indies. In winter, arctic conditions are delivered to us.

In a nutshell then, our climate is characterized by the interaction of these two air masses, livened up by the steady passage of high and low-pressure systems. This leads to a great deal of variability, often from one day to the next. It also means that we have a climate marked by great seasonal fluctuations in temperature. Few places have seasons as clearly defined as northeastern North America.

Snowfall in the Kawarthas is fairly evenly distributed over the winter months.

In the period from 1971 to 2000, the weather station at Trent University recorded an average snowfall of 42 centimietres in December, 39 in January, 31 in February and 27 in March.

A typical winter storm here is preceded by northeast winds, as a warm, moist air mass moving up from the south meets a mass of cold, dry air coming down from the north. Winter storms derive their energy from the clash of these two air masses of different temperatures and moisture levels. The point where the air masses meet is called a front. If cold air advances and pushes away the warm air, it forms a cold front. When warm air advances, it rides up over the denser, cold air mass to form a warm front. This upward movement causes the water vapour to crystallize and to fall in the form of snow. In the most severe blizzards, the snow seems to fall almost horizontally, as driving winds force it through even the smallest cracks and openings.

The next time you experience an icy blast of winter air, take a moment to reflect upon its far-off place of origin, near or within the Arctic Circle. Here, the combination of long, dark, winter nights, clear skies, and a surface covered with ice and snow progressively chills the air. The sun provides little in the way of warming heat, since it only skirts the horizon for much of the winter. The snow and ice reflect away what little light the sun beams down. Therefore, the thermometer eventually plummets to the frigid temperatures of the high atmosphere. As the air chills, it becomes denser, and forms a huge dome of high surface pressure. As Keith Heidorn writes in his recent book, And Now ...the Weather, "eventually, this cold dome breaks its bond with the spawning ground and rushes wildly southward. Howling winds precede the great air mass, announcing its advent. Trees shudder. Birds shiver."

However, colliding pressure systems are not always necessary to produce stormy weather. Being downwind of Lake Huron, the Kawarthas also receives a small portion of the "lake effect" snowfall that Huron creates. During the summer, the Great Lakes absorb large amounts of heat. Because water heats slowly but retains its stored heat for a substantial time, the open waters of the Great Lakes are much warmer than the arctic air that crosses them, especially during the late fall and early winter. This makes November and December the prime months for heavy lake-effect snows.

How this works is interesting. When cold arctic air sweeps over the relatively warmer lake water, the water heats the air's bottom layer as lake moisture evaporates into the cold air. Since warm air is lighter, or less dense than cold air, the heated air rises and begins to cool. As the air cools, the moisture that evaporated into it condenses and forms clouds, and snow begins falling from the cloud if the air is humid enough.

Because of the Kawarthas' upwind location in relation to Lake Ontario, we do not receive lake-effect snow from this direction. However, you can still see the clouds that form over the lake, even on a sunny day. Looking south from a height of land in Peterborough or when driving south on Highway 115 or 28, watch for a huge bank of clouds along the horizon. These clouds form when water vapour rising from the relatively warm lake condenses in the cold air above.

Also, despite our proximity to the lakeshore, Lake Ontario has relatively little moderating effect on our climate. This is because the Oak Ridges Moraine essentially shields the Peterborough area from lake influences. The moraine is a range of sandy hills which runs east to west from the Trent River to the Niagara Escarpment. When one is driving south on Highway 115, the moraine more or less starts at Tapley Quarter Line and continues on to approximately Orono. If you're heading down Highway 28, you come upon the moraine just south of Bewdley.

The impact of this height of land is quite pronounced. For example, the last frost in the Kawarthas (usually around May 18) is generally a week later than along the lakeshore, and our first frost (usually about Sept. 28)) a week earlier.

The moraine's influence is also apparent in the dramatic difference in snow cover that we see in the Port Hope or Oshawa area. Close to the 401, there is either no snow or just dirty slush. Once we get up onto the moraine, however, this changes to the clean snowcover that usually extends right up into the Kawarthas and beyond. Not only are we shielded from the moderating effect of the lake, but Peterborough is also located some 116 metres higher than Lake Ontario which, of course, contributes to the cooling.

Peterborough and the Kawarthas, written in 1985 by the Department of Geography at Trent University and edited by Peter Adams and Colin Taylor, provides an excellent explanation of the many factors that influence our local weather and climate. The book also covers local geology, hydrology, biogeography, the cultural landscape and suggested field trips. It's interesting to note that even 22 years ago, the authors were already concerned about climate change caused by human impacts on the environment. A second edition of the book, completed in 1992, can be found on the Trent Geography Department website at: http://www.trentu.ca/academic/geography/ Click on the publications button.

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