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# Two Studies of Increasing Mist at Niagara Falls Find Two Different Culprits

**By COREY BINNS**

From his seventh-floor office at the State University of New York at Buffalo, Marcus Bursik can watch the mist rising from Niagara Falls, about 20 miles away. In size and shape, the mist resembles the volcano plumes that Dr. Bursik studies as his primary topic of research. Noticing that the dimensions of the Niagara plume changed from day to day, he decided to investigate them.

Across the border in Canada, the Niagara Parks Commission was doing the same thing for a different reason: over the past decade, the number of misty days had more than doubled. The mist may have looked nice from a distance, but it was spattering patios, ruining Kodak moments and chasing tourists under awnings and umbrellas.

In 1996, the commission recorded 29 misty days, but by 2003 that number had risen to 68. Complaints from workers at outdoor restaurants were rising, too. “People love to see the mist billowing up into the air,” said John Kernahan, the commission’s general manager, “but they’re not happy when the mist starts coming over and getting them wet.”

The two investigations reached very different conclusions, perhaps because they used very different methods.

In 2004, the Canadian parks commission hired Rowan Williams Davies & Irwin, an engineering firm, to study the problem by creating a scale model of the area in a wind tunnel. The consultants determined that high-rise hotels sprouting on the Canadian side — nine in the past decade — were altering the airflow near the falls, drawing vapor toward the land and creating more days with rainlike conditions.

Dr. Bursik, who began his research in 2002 and presented it last April at a conference sponsored by the university’s Environment and Society Institute, applied the principles of volcanology. It turned out, he said, that whether a plume rises from a waterfall or Mount Vesuvius, its size and shape are greatly influenced by differences in temperature.

“The plume at Niagara Falls,” he said, “is just like any other plume.”

At Niagara Falls, water roars over the edge and hits the water and rocks below, smashing into tiny droplets. When the water temperature is warmer than the air, the droplets mix with the air and warm it. The mixture expands,

and the plume rises like a hot-air balloon. As it rises, the plume sucks in even more misty air. The greater the temperature difference between the air and the water, Dr. Bursik says, the taller and bigger the plume will grow.

Volcano plumes work the same way, but the extreme difference in temperature between the air inside and outside a volcano, and the large amount of ash and pumice spewed, means the plumes can grow much larger than those at Niagara Falls, which can reach 3,500 feet. Fall and winter bring the biggest plumes, when temperature differences between the air and the water are greatest.

In late autumn, temperatures at Niagara begin to drop to 30 to 40 degrees, while water flowing into the Niagara River from Lake Erie retains its summer warmth, as high as 60 degrees. Frigid winters envelop the region, and air temperatures can plummet 30 degrees below zero, but the constant flow at the falls keeps the water from dipping below 32 degrees. Those temperature differences make more mist, Dr. Bursik said.

To ensure that they were not ignoring any contributing factors, Dr. Bursik's research team measured the direction of the wind where the 2004 study reported the hotel-induced gust, but they found no change. "Making scale models of things sometimes just doesn't work too well," he said. "Usually it's because you haven't gotten the conditions close enough to nature."

But Mr. Kernahan, of the Canadian parks agency, is not convinced.

"They are two different studies," he said. "One's about how big the mist is, and one is about where it lands. We were looking at the day-to-day operational impacts of the mist."