What's Our Weather Coming To?

By causing changes in the earth's atmosphere, mankind could be courting disaster

By David Spurgeon

Last summer, Canada's Prairies sweltered in dry, scorching heat that wiped out crops and starved grazing cattle. In June, temperatures in Saskatchewan were four to seven degrees above normal. Alberta had one of its hottest years in recorded history.

The record-breaking heat extended into Ontario and Quebec. In Toronto, six afternoon highs above 35° were recorded in the hottest July since 1955. Southwestern Quebec experienced the warmest July in years.

We were not alone. Heat and drought hit parts of the United States hard, and many other countries, including the Soviet Union and India, experienced record-high summer temperatures. In September, the century's worst hurricane roared through the Caribbean.

Scientists have been talking about the dangers of global warming for decades, but 1988's heat waves finally brought the warnings home.

Average global temperatures have risen more rapidly in the last 20 years than at any time since reliable records began nearly a century ago. The 1980s have seen the six warmest years on record, and 1988 was the warmest ever.

Not all atmospheric scientists agree, however, that a natural long-term warming trend has set in. Stephen Schneider, senior scientist at the U.S. National Centre for Atmospheric Research, says short-term temperature variations occur often, and may bear no relation to the thousand-year intervals by which climatic trends are measured. In the mid-1960s, North America had prolonged cold spells, and some scientists saw this as evidence of the onset of a new ice age. Yet during the '80s, temperatures have again been on the rise. Kenneth Hare, chancellor of Trent University in Ontario, and chairman of Canada's Climate Program Planning Board, says, "The observed rise in temperature and the theoretical predictions are fully consistent for the past century. I tell anyone who asks me that I think the global warming trend has begun."

Whatever their differences, virtually all climatologists agree that the so-called greenhouse effect — the trapping of heat within the earth's atmosphere by gases resulting from human activities — is real. While scientists don't agree on *when* such changes will show up and what the effects will be regionally, there is general consensus that eventually it *will* lead to higher average temperatures worldwide.

Since the Canadian Climate Program was set up in 1978 by the federal government, this nation has been a leader in research into the probable social and economic impacts of climate warming. If, as many experts predict, emissions of CO_2, the prime greenhouse gas, double in the

next 50 years, Canadian scientists foresee such consequences as these:

• Warmer, drier weather in some parts of Canada; warmer and wetter in others. The total amount of global precipitation will likely increase, but rainfall patterns are expected to shift towards the poles. This will result in a probable increase in drought in mid-latitude regions of the Northern Hemisphere and greater moisture in the polar regions.

• Disappearance of ice cover on all the Great Lakes except Erie, and lowering of normal lake levels by as much as 80 centimetres over the next 50 years.

• Disappearance of wetlands such as Ontario's Point Pelee National Park, with resulting loss of wildlife habitat.

• A shortening of the ski season in southern Quebec by 50 to 70 percent.

• Hindering of winter road operations in the Arctic, as permafrost is weakened, and possible damage to pipelines.

• Occasional five- to ten-year periods in Saskatchewan in which crop production would be reduced by nearly half, producing average annual agricultural losses of about $600 million and 2600 jobs.

• The so-called Charlottetown scenario: a one-metre rise in sea level causing the inundation of a number of low-lying areas in the Maritime Provinces. In Charlottetown, the waterfront and several of the downtown streets would be flooded. Much rich farmland along the St. John River would disappear.

The same phenomenon, of course, would affect the eastern seaboard of the United States. According to a report by Ted R. Miller, senior research associate at Washington's Urban Institute, the rise in sea level "will probably require diking and pumping, or raising the land surface, in more than half of the twenty largest metropolitan areas. Northeastern cities might have to spend billions on new water sources."

Climatic Extremes. The prospects of dramatic climate change brought more than 300 experts from 46 countries together in Toronto in June 1988 to discuss causes and consequences. They agreed that the atmosphere is being changed at an unprecedented rate by factors such as man-made pollution and the inefficient use of fossil fuels. Besides the CO_2 coming from the burning of fossil fuels such as coal, oil and natural gas, the greenhouse gases include nitrous oxide from a variety of sources including automobile exhaust, methane from agricultural activities, and chlorofluorocarbons (CFCs), which are used as spray-can propellants, refrigerants and ingredients in plastic foams. The greenhouse gases, says the Toronto conference report, will cause warmer weather at some times and places, change rain and snowfall patterns, raise sea levels and bring more frequent climatic extremes such as heat waves and more violent storms.

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Hurricanes, for example, will likely increase in severity. The current maximum speed – 280 km/h – might rise to about 340 km/h, thus increasing the devastation a hurricane causes.

Worldwide, the average temperature rise foreseen just as a result of a doubling of CO_2 emissions is somewhere between 1.5° and 4.5°. That may not sound like much. However, the difference between today's average world temperature and that of the last ice age is only 5°!

Says James E. Hansen, director of the Goddard Institute for Space Studies, an American government agency, "The temperature changes due to the greenhouse effect should be clearly evident by the 1990s, and within fifteen to twenty years the earth should be warmer than it has been for the past 100,000 years."

In the past 100 years the average world temperature has risen by 0.6°, as great a rise as any in the past 1000 years. CO_2 levels have risen about ten percent over the past 30 years.

Warmer worldwide temperatures may have already meant rising sea levels in Canada. John Cousins, a teacher at Westisle Comprehensive High School in Elmsdale, P.E.I., says, "In the village where we grew up, there were houses along the beach. Today, those houses would be in the water."

Stephen P. Leatherman, director of the University of Maryland's Laboratory for Coastal Research, says the sea level along the U.S. east coast has risen by over a third of a metre during the last century, leading to the disappearance of more than 2000 hectares of marshland in Chesapeake Bay, Maryland. In Louisiana some 2000 hectares of marshland a year are being lost.

Links between the weather and human deaths in U.S. cities have been studied by Larry Kalkstein, professor of climatology at the University of Delaware. He found that during the worst part of a 1980 heat wave in New York City, deaths increased 50 percent. His research also revealed that people in northern cities were more vulnerable to heat waves than those in the south. Kalkstein believes that the death rate from weather-related causes in many northern cities will increase seven to nine times if people can't acclimatize to higher temperatures.

A Matter of Will. Assuming we take climate warming seriously, as scientists urge us to, what can we do about it? The answer is a single word: adapt.

There are ways to minimize the risks of harmful climate change. We can revive energy-conservation practices and thus do a great deal to minimize our contribution to the buildup of greenhouse gases. Reacting to the oil crisis of the '70s, Canada and other countries set up programs to cut fossil-fuel consumption. The programs worked, but once the crisis had passed, there was a return to wasteful habits of energy use. The Toronto conference called upon nations to reduce CO_2

emissions by approximately 20 percent of 1988 levels by the year 2005 as an initial goal. This will require greater use of energy sources such as solar, hydro and wind power, and possibly nuclear power. And improved automobile design can cut gasoline consumption.

We can urge our MPs to speed up the elimination of chlorofluorocarbons. Canada joined 36 other nations in signing a 1987 protocol in Montreal to cut CFC production and consumption 50 percent by 1998. Besides enhancing the greenhouse effect, CFCs are depleting the ozone layer, which protects all life against excessive ultraviolet radiation from the sun. But recent scientific findings show that the rate of ozone depletion is already faster than the Montreal Protocol participants had feared.

We can demand greater efforts to save the world's forests. They store vast quantities of CO_2. By destroying them, we make it much harder for nature to limit the greenhouse effect. Setting limits on the rate of destruction of the forests, particularly in the tropics, must be a top priority, says Noel Brown, North American director of the United Nations Environment Program.

"Above all," says Henry Hengeveld, adviser on climate change to Environment Canada, "we must not underestimate the influence we can have as ordinary citizens. For one thing, our country is a high per capita user of energy. It's a question of changing our attitudes."

Geographer John Doucet, who once worked for Hengeveld, calculated that in 1985 each Canadian was responsible for emitting some 4000 kilograms of carbon in the form of CO_2 into the atmosphere. Says Doucet: "If you didn't drive your car to work for a round-trip of twenty kilometres each day, and instead used a car pool or took public transit, you would reduce your per capita contribution of CO_2 emissions by about ten percent. And by using the best energy-saving technology now available, we can reduce our overall CO_2 output by at least twenty-two percent by 2005."

We have the means to modify the effects of climate change. We need the will to use them. "We realize now that we may be on the threshold of climatic changes so extensive that they will profoundly affect the life of the human race," Norway's prime minister, Gro Harlem Brundtland, told the Toronto conference. "It will happen unless we take decisive corrective action!"

Escape Clause

THE activities director at a state correctional institution in Pennsylvania points out the limitations of a prison athletic program: "No pole-vaulting, no cross-country running and no away games."

– Herm Albright in Beech Grove, Ind., *Perry Weekly*