

CURRENT SCIENCE®

January 4, 2008 • Vol. 93 • Issue 9 www.weeklyreader.com

Meltdown

Arctic ice is disappearing
faster than expected,
accelerating global warming.



Meltdown

Arctic ice is disappearing faster than expected, accelerating global warming.

Don't let the name fool you. Greenland is hardly the lush oasis that its name implies. It looks more like the barren ice world of Hoth from *Star Wars*, with more than 1.7 million square kilometers (660,000 square miles) of Arctic ice covering almost all of its mainland.

At least, that's the way it's been for the last 2 million years. Today, however, Greenland is changing. The largest island in the world is melting, as is much of the Arctic region. Recent studies show that at least 217 cubic kilometers (52 cubic miles) of Greenland's ice sheet are now melting every year.

That change has Mark Serreze very concerned. Serreze, a senior researcher at the National Snow and Ice Data Center, says scientists knew that the globe was warming and that the ice sheet covering Greenland was melting. Still, they were stunned by this year's data, which shows how fast the sheet is melting—and how quickly Arctic sea ice is melting too. Sea ice forms when ocean water freezes.

Serreze says, "2007 sets an all-time record for the least sea ice we've ever seen—by a long shot. We were agog at how much we've lost. This year alone, we've seen sea ice disappear that's roughly equal to the area of Texas and Nevada."

ICE MIRROR

Greenland's ice sheet and the Arctic sea ice that covers the northern

polar region play a major role in regulating climate: They have a high *albedo*, or capacity to reflect the sun's energy. They mirror sunlight back into space, keeping the planet relatively cool. As the Greenland ice sheet and Arctic sea ice melt, there is less ice to reflect sunlight. The planet absorbs more of the sun's energy, becoming even warmer and causing ice to melt at an even faster rate year after year. This troublesome cycle, called *climate feedback*, accelerates global warming.

Jacob Sewall, a professor of geosciences at Virginia Tech, says polar ice plays a second key role in

keeping the planet cool. It keeps a lid on the heat deep inside Earth. "If the ice melts, the shield that was protecting us slides away, and the [internal] heat escapes up into the ocean and atmosphere," he says. The climate feedback problem only grows worse.

RISING TIDES

At first, the melting of Greenland's ice sheet won't affect that many people. Greenland has a population of just 56,000. Soon, however, says Serreze, the effects will reach the United States. As Greenland's ice melts, trillions of liters of water



Ice sheets around the globe are melting. This glacier in Norway has retreated 2 kilometers (1.25 miles) since it started melting in 1928.

will flow into the sea, raising ocean levels around the globe.

Consider life in the Sunshine State not so long from now. "Florida is basically at sea level," says Serreze. "So even a modest rise, just a couple of meters, could put Miami underwater." Other U.S. cities, including New Orleans, La., and Huntington Beach, Calif., are actually situated below sea level.

For those areas, the rising tide caused by Arctic melting is a fast-approaching emergency. For protection, an increasing number of cities will need to build concrete levees, or embankments, to hold back the ocean's waves.

In the United States, residents of the Atlantic and Gulf coasts already know the danger hurricanes pose. In 2006, hurricanes caused about \$3.8 billion in damages.

Arctic melting is going to make those winds even more dangerous,

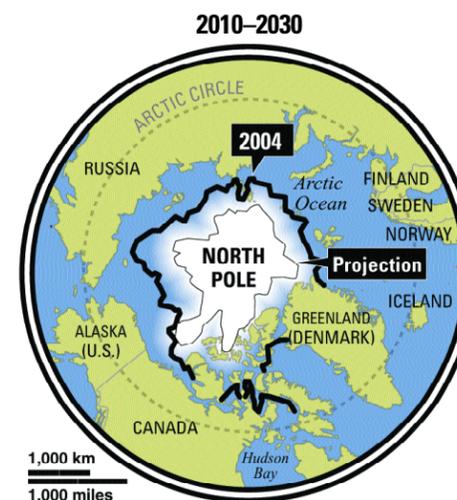
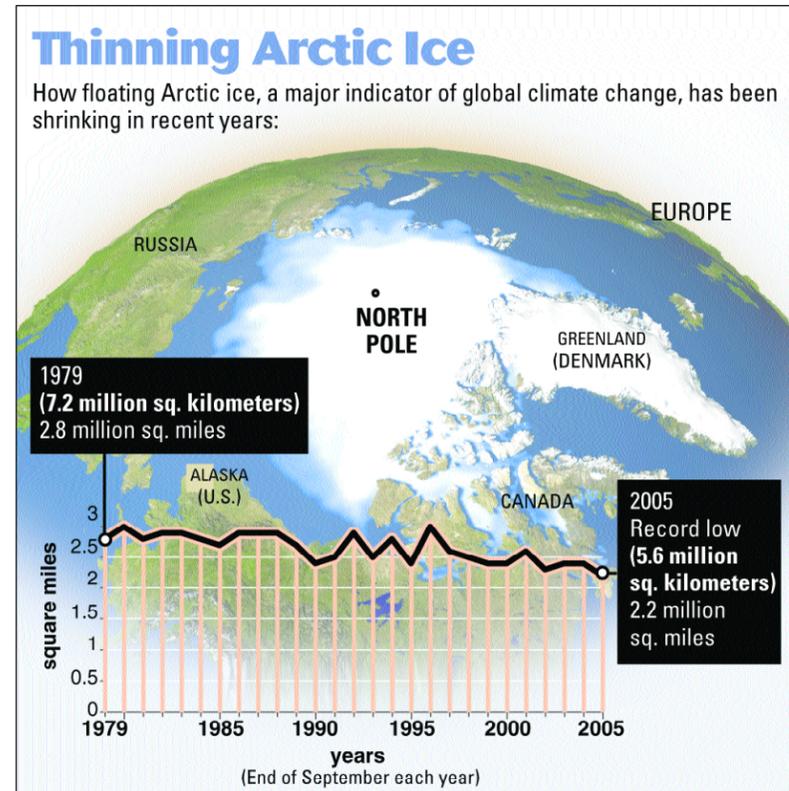
says Serreze. As the sea ice melts and less sunlight is reflected, the oceans will absorb more of the sun's rays and their temperatures will climb. And as the oceans grow warmer, they'll produce more of the rising water vapor that powers each hurricane's swirl. "Think of a hurricane as an immense heat engine," Serreze says. "If you evaporate more water, it works all the more efficiently."

Even for people who live far from the coast, Arctic melting will have a serious impact, says Sewall. Does your family run a blueberry farm in Missouri or produce maple syrup in Vermont? If so, don't count on inheriting the family business. That's because the melting of Greenland's ice sheet will alter the *jet stream*, a current of wind that sweeps around the world at altitudes between 16 and 24 kilometers (10 and 15 miles), affecting our climate.

"As the ice melts, a column of air rises up like a tower or a wall," explains Sewall. "Imagine you have this obstruction that's suddenly there, over Greenland. Now the jet stream has to flow around it." As the flow of air is pushed northward, vast stretches of the United States will grow hotter and receive less rainfall.

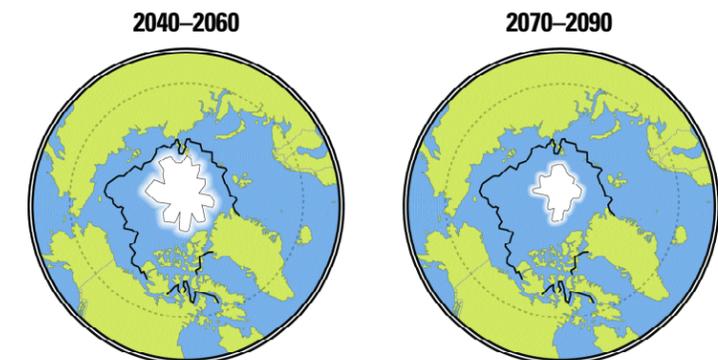
In a drier climate, blueberries may not flourish the way they do now. As temperatures rise, maple trees may no longer grow in New England. "If you're a kid in Southern California, you're going to be saying, 'Remember when it used to rain?'" says Sewall. "In Miami, you'll say, 'Remember when these beaches weren't underwater?'"

Sewall says we should start preparing now for startling shifts in nature. "We're changing the environment," Sewall says. "Now we're going to have to change in response to those changes." **CS**



Projected Melting of Arctic Summer Sea Ice

At least half the summer sea ice is projected to melt by the end of the century.



Source: Arctic Climate Impact Assessment, World Wildlife Fund; Graphic: KRT/Newscom