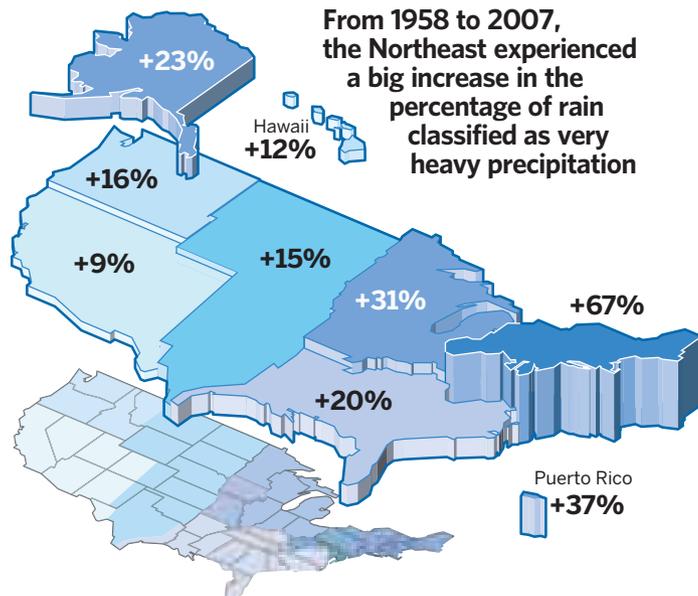


GLOBAL WARMING

HEAVY RAINS INCREASING

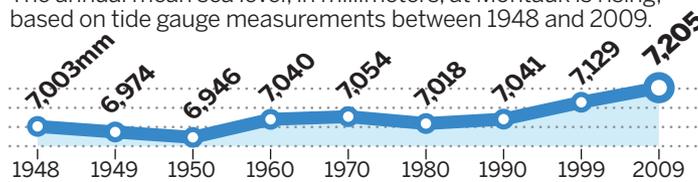


SOURCE: "U.S. GLOBAL CLIMATE CHANGE IMPACTS IN THE UNITED STATES," 2009. U.S. GLOBAL CHANGE RESEARCH PROGRAM

NEWSDAY / ROD EYER

RISING LI SEA LEVEL

The annual mean sea level, in millimeters, at Montauk is rising, based on tide gauge measurements between 1948 and 2009.



SOURCE: PERMANENT SERVICE FOR MEAN SEA LEVEL (PSMSL), A U.K.-BASED REPOSITORY FOR GLOBAL TIDAL GAUGE DATA USED TO MEASURE LONG-TERM SEA LEVEL RISE.

NEWSDAY

AVERAGE TEMPS HIGHER

Annual high and low temperatures reached each day in Islip, averaged over a decade.

1971-1980
59.1°
 ANNUAL HIGH
43.1°
 ANNUAL LOW

2001-2010
60.8°
 ANNUAL HIGH
44.5°
 ANNUAL LOW

SOURCE: NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

BY JENNIFER SMITH
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Climate change is altering Long Island and the results are all around us — from longer growing seasons and earlier blooms to an influx of birds extending their range northward.

Temperatures measured at Islip are on average 1.5 degrees higher than they were 30 years ago. Over 40 years, the waters of eastern Long Island Sound have warmed 1.8 degrees, a trend scientists suspect will eventually drive lobsters away.

Heavy downpours — the kind that flood streets, soak basements and sweep pollutants into bays — increased 67 percent in the Northeast from 1958 to 2007, a federal report found.

Local marine waters have also become more acidic as carbon dioxide levels rise, researchers say, making it harder for clams, scallops and oysters to form shells.

The Earth's climate system is being rewired, experts say, by unprecedented levels of carbon dioxide and other gases that trap heat in the atmosphere.

"Be in no doubt, the world is warming," said Peter Thorne, a scientist with the National Oceanic and Atmospheric Administration and co-author of the agency's "State of the Climate" report released in June. The study found atmospheric concentrations of greenhouse gases — much of it produced by burning of fossil fuels — are increasing around the globe.

The majority of climate scientists say man-made emissions are primarily responsible for documented changes in climate over the past half-century, said climate scientist Paul Higgins, citing analyses of scientist opinion published in 2004 and 2010.

"The evidence for it is conclusive and overwhelming," said Higgins, who is also associate director of the American Meteorological Society's policy program.

Still some skeptics question the link between human-generated greenhouse gases and glo-



Global warming has caused sea level on Long Island to rise nearly

bal warming, suggesting natural processes such as solar radiation play a role. Other doubters include industry groups, think tanks and politicians who oppose government regulation of greenhouse gases on economic or ideological grounds.

But for the most part, debate in scientific circles is no longer over whether global warming is happening — it's over how damaging the impacts will be and how soon they will be felt.

Scientists are compiling alarming evidence: Arctic glaciers and sea ice are melting. Global sea levels are rising as oceans warm and expand. The permafrost that covers one-fifth of the planet's land mass is thawing, releasing more carbon dioxide and methane.

Warming oceans have already increased the threat of destructive tropical storms and hurricanes, according to federal climate scientists. Rising seas, they say, will worsen coastal flooding and erosion.

For Jamesport Vineyards on the North Fork, global warming has been a boon so far.

Co-owner Ron Goerler Jr. has been able to plant a wider variety of grapes due to milder temperatures. Still, his winery is about a mile from Flanders Bay, where the peninsula could be whittled away.

"Thirty years from now," he said, "I might be saying I've got waterfront out here."

Shorelines and sea level

Bob DeBona, of Mastic Beach, thinks climate change has a lot to do with the waterfront erosion he's witnessed since the 1950s.

"I see a lot more flooding, and I see the sand shifting and the shorelines drifting apart," said DeBona, 65, who heads the local Property Owners Association. "You can see where the marsh is disappearing."

Coastal wetlands buffer the mainland from damaging storm

turns up heat on LI



11 inches over the past century, a trend that is expected to accelerate.

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surges, they filter pollutants from bays, and shelter birds and marine life. That protection could be lost if the marshes are drowned by rising oceans.

Tide gauge measurements show sea level on Long Island has risen nearly 11 inches over the past century. Much of that's due to global warming, said James G. Titus, an expert in rising sea levels at the federal Environmental Protection Agency. Many scientists expect the trend to accelerate as greenhouse gas emissions increase,

and they're urging communities to plan ahead.

The Goddard Institute for Space Studies and Columbia University's Earth Institute predict sea levels around Long Island could rise as much as 4½ feet over the next 70 years. That could mean greater threats to the homes of nearly a half-million residents who live in the low-lying South Shore floodplain, according to estimates by Nassau and Suffolk officials.

"People need to decide whether they're going to hold back the sea everywhere or get people out of harm's way," Titus said.

DeBona views the future with a mix of anxiety and resignation. Some roads around the association's marinas are at water level already. Areas prone to flooding should be elevated or abandoned, he said, and some beaches need protection.

Standing near a recently replenished strip of sand near Washington Drive known as Beach 1, DeBona said: "If it's

not maintained, it's going to be gone."

Birds, buds and bugs

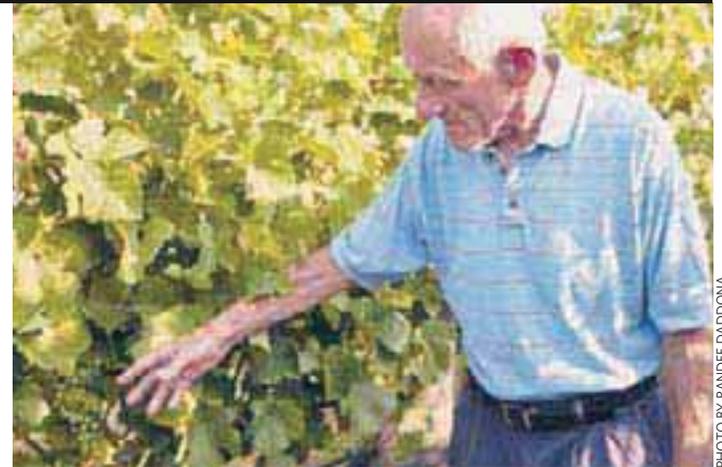
Milder winters have opened new territory for birds like the Carolina wren, whose population in New York has tripled since the 1980s.

Northern cardinals and tufted titmice have also become much more common in the Northeast, said Benjamin Zuckerberg of the Cornell Lab of Ornithology's Citizen Science Program.

Marilyn England, 69, of Center Moriches, a longtime birder and conservation advocate, has noticed the changes, especially the appearance of cardinals.

"When I was a child on Long Island, there weren't any around," she said.

Plants, too, have responded as the region warms. In Bridgehampton, lilacs that once bloomed in late May now burst forth lavender petals a couple



Ron Goerler Sr., co-owner of Jamesport Vineyards, can grow a wider variety of grapes because of the milder temperatures.

of weeks sooner. New York's apple orchards are experiencing the same phenomenon.

In 2010, the last spring frost of the year was, on average, 5.8 days earlier than in 1970, according to data from Nassau, Suffolk and Westchester. The longer growing season has allowed vintners such as Goerler to expand their offerings, producing wines such as Syrah from grapes that now ripen on the vine until late fall.

Less welcome for farmers: an increase in heavy rains and a potential bumper crop of insects.

"Those storms have been hurtful," said Joseph Gergela of the Long Island Farm Bureau. Wet weather shortened this year's strawberry season, he said. Downpours have flooded farms and damaged tender crops such as leafy greens.

More warm days could also bring an increased risk of disease or give crop-damaging insects extra time to breed, said Art DeGaetano, who heads the Northeast Regional Climate Center at Cornell.

"The timing of things may be off," he said, "particularly if the plants are blooming earlier, but they're out of sync with the insects that pollinate them."

Shellfish: Uncertain future

Peconic Bay scallop grounds yield only a fraction of what they once did. Clamming in the Great South Bay has yet to recover from a catastrophic 1980s collapse.

Now comes global warming.

Bayman Anthony Sougstad, 72, of Freeport, blames the decline of local shellfish on pollution and destruction of eelgrass and marshes. So do many scientists, who say harmful algae and overfishing are also culprits.

Recent research, however, indicates climate change has probably played a role as well. Carbon dioxide in the atmosphere is absorbed by the ocean, making it more acidic and lowering pH levels. That means it's harder for clams and other bivalves to make their protective shells, said Chris Gobler, an associate professor at Stony Brook University.

His research team took larvae from Long Island clams and scallops and compared their development under three carbon dioxide scenarios: with preindustrial levels of acidification; current levels; and projected future concentrations. Forty percent of the first group survived. But only 20 percent grown at current levels made it, and just 6 percent survived under future conditions.

Lobsters also face an uncertain future. Long Island Sound was already at the southern end of its range when the fishery suddenly crashed in 1999. Although researchers say disease and low oxygen levels contributed to the die-off, they believe warming waters stressed the lobsters and may be preventing a comeback.

"It's quite likely that a threshold has passed where Long Island Sound is a suitable location for a thriving lobster fishery," said Mark Tedesco, director of the EPA's Long Island Sound office.

NEWSDAY PHOTO / J. CONRAD WILLIAMS JR.

PHOTO BY RANDIE DADDONA