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## WARY EYES ON RISING WATER

Study: Sea level may increase 42.5 inches by 2080

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The Journal News

In late November 1950, what was billed as the storm of the century lashed the East Coast with 108-mile-an-hour winds, torrential rains, heavy snow and 10-foot storm surges, leaving more than 225 people dead along the Atlantic seaboard.

La Guardia Airport, only six feet above sea level, was under water, as were Rye Beach, Playland, Mamaroneck's Harbor Island, the Echo Bay area in New Rochelle and coastal regions all along Long Island Sound.

The storm was considered noteworthy because of its strength and rarity — only two such storms hit New England in the past century. But scientists and environmental officials now fear that rising global temperatures, which are raising sea levels, may make such destruction far more common.

“We have a base-level storm as the 100-year-storm, and we use that for planning,” said Cynthia Rosenzweig, senior research scientist at NASA's Goddard Institute for Space Studies and the Columbia University Earth Institute in Manhattan. “When you have a sea-level rise, you do not need as strong a level of storm to cause the same amount of damage.

“Instead of having that level storm once in 100 years, which is equivalent to a Category 3 hurricane, by 2080 it could occur once every four years, and the damage would be caused by a Category 1 hurricane,” she said.

Rosenzweig heads Columbia's Climate Impacts Group, a consortium of academic centers and government agencies that completed a federal study in 2002 on the potential impact of rising sea levels on a 31-county metropolitan area. The region included New York City north to Sullivan and Dutchess counties, Long Island, 14 counties in northern New Jersey and three in Connecticut.

The “Climate Change and a Global City” study, commissioned by the National Oceanographic and Atmospheric Administration and the National Science Foundation, projects the level of oceans and tidal estuaries worldwide — including the Atlantic Ocean

and Hudson River estuary — will rise between 4 and 12 inches by 2020, with an ultimate increase of 9.5 to 42.5 inches by 2080.

The oceans' rise stems from increasing temperatures that are melting parts of the polar ice caps, and glaciers in Greenland and the Himalayas.

“Over the past 100 years, the temperature has gone up only 2 degrees,” said Rosenzweig, a Tarrytown resident. “But the climate appears to be changing and we see steadily increasing temperatures.”

For the region studied by the consortium, the average temperature is projected to increase up to 3.5 degrees by 2020, 6.5 degrees by 2050 and 10 degrees by 2080.

“What appears probable is that there will be a progressive warming throughout the coming century,” Rosenzweig said.

What this means for everyone from homeowners and developers to government planners and environmentalists is that the existing infrastructure that supports the way we live will need considerable attention if it is to survive potentially worsening weather patterns.

The New York City Department of Environmental Protection has launched a four-year study with NASA on the effect rising water levels may have on the drinking water, storm water and sewage systems throughout the city and its 2,000-square-mile watershed. The city's water system serves about 9 million people daily, including 85 percent of Westchester and 15 percent of Putnam County residents.

“The water table is rising worldwide,” DEP Commissioner Christopher Ward said, “and it has real implications for the long-term infrastructure planning in the city. As the water rises, it will affect combined sewer overflows and construction sites like the World Trade Center where you are pumping out water.

“I have no idea at this point what steps we may need to take,” he said. “But we are getting ready for what is going to happen over the next 40 years. Major infrastructure changes will have to be planned for.”

The DEP study will join similar studies conducted by the European Union to expand the database of information on the effect of rising temperatures and sea levels on urban infrastructure and water-supply systems.

DEP officials said the rising water levels may require a redesign of the city's combined system for treated sewage and storm water, which has 452 outlets in the region's waterways, including Long Island Sound and the Hudson River.

These outlets are controlled by gravity and water pressure, with storm water and treated sewage flowing out during periods of low tide. If the water level is two or three feet higher, the existing system may not work without the addition of pumping stations and

other expensive engineering changes, Ward said.

Westchester County's sewage treatment plants in Yonkers, Ossining, Peekskill, Port Chester, Rye, Mamaroneck and New Rochelle also would be adversely affected by rising water levels, said Anthony Landi, head of the county's Department of Environmental Facilities.

"If you get a rise of three or four feet in the Hudson River and the Sound you would also get inflows of water into the sanitary sewer system and the (treatment) plants," Landi said. "You see a problem now with additional flows into the plants during extremely wet weather."

Across the river, more than 75 percent of Rockland's sewage flows through the county sewer district and Orangetown treatment plants. Sewage from the plants meets in one pipe that runs parallel to the Piermont Pier and extends several hundred feet out into the Hudson River.

The system is driven by gravity and water pressure. "If the river level were to rise by the projected amounts," sewer district Director Ron Delo said, "it would definitely have an impact."

The increased pressure from a higher river would also impede the outflow from the Stony Point and Haverstraw systems, whose treated storm water and sewage flow out into the Hudson.

"Rises of that magnitude would also raise storm drainage issues, particularly in Piermont and the village of Grand View, parts of Nyack and Upper Nyack," Delo said. "In fact, all the river communities will really have to take a hard look at their storm drainage systems."

The rising temperatures may well trigger more extreme weather, said NASA's Rosenzweig, which would affect the watersheds and the sewer system. Warmer temperatures would trigger more demand for water from residents, and increase evaporation of the reservoirs since warm air holds more water vapor.

In addition, Rosenzweig said, "In periods of low precipitation you are likely to have more droughts or periods of very little rain. But when it does rain, it is likely to be far more intense, resulting in flooding."

An increased intensity of regional storms would affect a variety of coastal systems and structures. Klaus Jacob, a research scientist at the Lamont Doherty Earth Observatory in Palisades, who participated in the 2002 climate change study, said major structures in the region were built based on sea level standards set by the government in 1929. These structures, such as the Holland Tunnel, were built to withstand storm surges of about six feet.

With rising water levels, Jacob said, future storms could result in flood waters covering the entrances to the Holland, Lincoln and Brooklyn Battery tunnels, and the 1 and 9 train stations at Battery Park.

“When you superimpose storm surges on the region, you have to start from a new base that is three feet or four feet higher than what was originally planned for,” Jacob said. “We have had flooding in Nyack when the water level came up six feet during a mild northeastern storm. It will be much worse if the Hudson River is higher to begin with.”

Jacob said flood zone maps now used to approve building projects along the Hudson River and Long Island Sound “are barely good enough for the present. Yet we are building structures that will be around a hundred years from now and do not take into account what the sea level will be and what the flooding will be.”

Croton-on-Hudson Mayor Bob Elliott agreed.

“A substantial amount of all of our parks along the Hudson River would be under water if it rose that much,” he said. “And if you look at the development which has been taking place along the river in many communities, a 42-inch rise in the Hudson would put a lot of developments under water. It’s something which hasn’t been considered.”

Some Hudson River communities, such as Yonkers, have steep slopes down to the river so rising water would have little effect on development. Low-lying areas in Mamaroneck, Nyack and Tarrytown, however, could be threatened.

“My house in Piermont sits in a flood zone,” Jacob said. “It may be the highest house on the block, but that doesn’t make me in good shape. It just makes the other houses worse off.”

From the back porch of his home on Shore Acres Drive in Mamaroneck, Vincent Monte-Sano watches Long Island Sound flowing past his gently sloping back yard and has little worry about rising waters.

“The houses on this block were built by an architect to be above the waterline of the 1938 hurricane,” Monte-Sano said “And in 25 years, the water has never come above the steps on the back porch.”

That Sept. 21, 1938, hurricane, often referred to as the “Long Island Express,” packed winds gusting to 183 miles an hour as the eye crossed the Sound, pushing a 10-foot storm wall that killed more than 600 people from Cape Hatteras, N.C., to southeastern Canada.

But if the projections of rising water levels prove to be accurate, Monte-Sano said, “then the ocean is going to affect every place around here. But look at the bright side — we won’t have to do as much dredging in the harbor.”

A rise in water levels also would affect coastal ecosystems in the river and the Sound.

Eric Lind, director of the 270-acre Constitution Marsh Audubon Center in Cold Spring, said a rising river could make it “far too wet for most of the plants.”

Swamp areas just above the high-tide level could evolve into marshes when the water covers them, providing habitats for some species of birds and plants.

“All of the marshes are hot spots for wildlife activity along the Hudson,” Lind said. “There are birds you will find in these places that you don’t find in open water or along the shoreline. There would be pretty dramatic changes to these marsh communities and near-shore habitats if the water rises.”

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