SCIENCE VERIFY

Yes, New York City is sinking

Both natural and human-caused processes contribute to sinking land, which is happening not just in NYC but across the East Coast and in cities around the world.

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Author: **Emery Winter**
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A viral tweet viewed nearly 9 million times claimed New York City is sinking under the weight of its buildings.

That was met by disbelief from many people who didn't believe it to be possible for various reasons like the city being built on bedrock.

THE QUESTION

Is New York City sinking?

THE SOURCES

- Study by University of Rhode Island Graduate School of Oceanography researchers and its press release
- Studies on sinking cities by Virginia Tech Department of Geosciences researchers in 2022 and international team of researchers in 2023
- New York City Panel on Climate Change 2015 report
- National Oceanic and Atmospheric Administration (NOAA)

THE ANSWER

Yes, New York City is sinking.

WHAT WE FOUND

New York City is sinking, on average, 1 to 2 millimeters per year, according to a recent study. This isn't anything new — older studies have come to the same conclusion. This also isn't unusual; many coastal cities around the globe are sinking at varying rates, and the entire Northeast U.S. is sinking at about the same rate as New York.

Cities like New York sink due to a geological process called subsidence. According to the National Oceanic and Atmospheric Administration (NOAA), subsidence, the gradual settling or sinking of the Earth's surface, can be caused by both natural and man-made sources. The removal of groundwater or other underground resources, soil compaction, earthquakes, erosion, glacial movement and even added weight can all make the ground sink.

A recent study by University of Rhode Island Graduate School of Oceanography researchers reaffirmed preexisting findings that New York City as a whole is sinking, on average, 1 to 2 mm per year. However, the study also found certain areas of the city are sinking much faster, closer to 3 to 4 mm per year.

Some of the areas sinking faster include parts of Manhattan and denser areas of Brooklyn and Queens, suggesting that the weight of New York City's many skyscrapers and other buildings are contributing to the city's sinking. However, less dense areas, like parts of Staten Island, are also sinking faster.

"While the massive weight of the buildings causes some of the subsidence, not all of the increased subsidence rate can be directly attributed to the buildings," a University of Rhode Island press release said. "According to the study, subsidence due to buildings usually stops within a year or two of construction. Continuation of subsidence past that time is largely due to other processes, such as withdrawal of groundwater."

Most of New York City is sinking at a rate consistent with the natural rate of subsidence in the region, the University of Rhode Island press release said. The U.S. East Coast has been naturally sinking for thousands of years, NOAA says. That's because when glaciers extended over parts of North America during the last ice age about 16,000 years ago, the glaciers weighed down the ground they sat on and made the land at their edges bulge upwards, much like what happens when you leave an indent by sitting on a cushion or mattress. The bulging land has been gradually sinking back down ever since the glaciers retreated.

Although New York City's subsidence is in the news because of the recent University of Rhode Island study, it's far from the first study or report to conclude the largest city in the U.S. is sinking.

In 2015, a report produced by the city's panel on climate change concluded the sea is encroaching on New York City at a rate faster than the global average partially because of "land subsidence due to excess groundwater extraction." The report said 40% of the city's "observed sea level rise" is actually because the city is sinking.

A study from April 2023 led by researchers from Virginia Tech's Department of Geosciences found that most of the East Coast from New Hampshire down to Miami, Florida is sinking, "with

rates exceeding 3 mm per year in most cities." The study identifies New York City as one of the major cities experiencing subsidence in the region.

And in 2022, an international team of scientists led by researchers from Nanyang Technological University in Singapore, found that almost all of the 48 largest cities on the planet are sinking, including New York City. It found New York City to be sinking at a rate just under 2 mm per year.

The 2022 study said that many of the fastest-sinking cities — which it said could be sinking at rates of 20 mm per year — are sinking in large part because of groundwater extraction and building weight.

Inland cities can sink, too — Mexico City in central Mexico is one of the most famous examples of a sinking city — but studies frequently focus on subsidence of coastal cities because sinking land adds to the preexisting threat of rising seas.

For example, about 40% of Jakarta, the capital of the island nation of Indonesia and one of the fastest-sinking cities in the world, now sits below current sea levels, according to the United Nations (UN) and NASA. As a result, the city is now experiencing major floods every few years, NASA says. In response, the Indonesian government has plans to protect the city with a giant sea wall and is moving its capital to another one of the country's islands.

New York City's sinking land has contributed to the city historically experiencing a rate of coastal sea level rise more than double the average global rate, according to the NYC Department of City Planning. As a result, some of New York City's lowest-lying areas already experience high-tide flooding even on days with no rain.