

**LAMONT-DOHERTY EARTH OBSERVATORY**  
THE EARTH INSTITUTE AT COLUMBIA UNIVERSITY

## News

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### Mud Records New York History



Earth Institute researcher Dorothy Peteet scoops a spoonful of sediment during a coring effort near Big Egg Marsh, Jamaica Bay.

Buried far beneath the **Photo by Bruce Gilbert**  
cattails and blackbirds

of marshes in the lower Hudson Valley are pollen, seeds and other materials preserved in marsh sediment in the Hudson River Estuary. By examining this material, researchers can see evidence of a 500-year drought, the passing of the Little Ice Age, and impacts of European settlers.

The study, which appeared in a recent issue of the journal *Quaternary Research*, shows how climate in this region has changed due to natural causes prior to human interventions in the area.

Dorothy Peteet, co-author of the study, points out that researchers could use these methods to similarly learn about climate in other parts of the world. Peteet is a researcher at NASA's Goddard Institute of Space Studies and the Lamont-Doherty Earth Observatory (LDEO). Dee Pederson, a researcher at LDEO, also co-authored the study.

Plants provide an indicator of climate because their health is determined by things such as temperature and moisture — a reason similar species grow in similar latitudes.

#### **Evidence of Settlers**

Early European settlers cleared forests for agriculture, and the pollen record shows a vast decline in tree pollen and an increase in pollen from weedy plants like ragweed, plantain, sorrel and dock during this time. Inorganic soil particles also went up following European settlement.

#### **The Little Ice Age**

During the Little Ice Age from the early 1400s to late 1800s, the vegetation changed to plants that favored cooler and wetter climates. The core records revealed increases in spruce and hemlock that prefer cooler and wetter climates.

#### **500-Year Drought**

Researchers found evidence of a Medieval Warm period from 800 to 1300 B.C. from the striking increases in both charcoal — a sign of dry vegetation and fires — and pollen from pine and hickory trees. Prior to this warming spell, there were more oaks, which prefer a wetter climate.

A core drilled into the marsh bed also yielded large influxes of inorganic soil particles, which is a sign of erosion. Erosion can be caused by widespread plant loss resulting from drought.

Droughts can also cause bay water to be saltier, and evidence of this was found by an increase in salty marsh plants such as saltmarsh cordgrass. The changing salinity of the marshes and estuaries could present future water quality issues in the event of a drought, as these changes have the potential to affect the water supply of New York City.

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The Lamont-Doherty Earth Observatory, a member of The Earth Institute at Columbia University, is one of the world's leading research centers examining the planet from its core to its atmosphere, across every continent and every ocean. From global climate change to earthquakes, volcanoes, environmental hazards and beyond, Observatory scientists provide the basic knowledge of Earth systems needed to inform the future health and habitability of our planet.

The Earth Institute at Columbia University is among the world's leading academic centers for the integrated study of Earth, its environment, and society. The Earth Institute builds upon excellence in the core disciplines — earth sciences, biological sciences, engineering sciences, social sciences and health sciences — and stresses cross-disciplinary approaches to complex problems. Through its research training and global partnerships, it mobilizes science and technology to advance sustainable development, while placing special emphasis on the needs of the world's poor.

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