

# The Evolution of an ?URBAN SEA?: paleoenvironmental studies of Long Island Sound (USA)

## [Seminario](#)

**Data:** Lunedì, 3 Giugno, 2013 - 14:30

**Aula:** [Aula Arduino](#)

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**Abstract:**

Long Island Sound (LIS), a large estuary east of New York City, has seen dramatic environmental changes since European settlement in the 1600s, which we documented by studying sediment cores. Pollen records show clear-cutting by European colonists, which led to an increase in influx of sediment. Hypoxia (proxied by carbon isotope values in benthic foraminiferal tests) started in the early 1800s, and the bottom water salinity of western LIS (proxied by oxygen isotope values in benthic foraminiferal tests) dropped by several salinity units (psu), primarily due to enhanced run-off through land use changes, possibly exacerbated by fresh water influx from waste-water treatment plants in the 20<sup>th</sup> century. Nitrogen isotope records show a sudden increase in  $\delta^{15}\text{N}$  around the middle 19<sup>th</sup> century, indicating influx of sewage-derived nitrogen. The enhanced nitrogen fluxes led to increased marine primary productivity, thus to increased mass accumulation rates of marine organic carbon, organic nitrogen and biogenic silica (diatom frustules). The total organic carbon mass accumulation rate in LIS increased by a factor of 5-8 between 1700 AD and the end of the 20<sup>th</sup> century. At the same time, the ratio of planktic (centric) to benthic (pennate) diatom species increased, probably a result of increased water column turbidity, and the abundance of heterotroph relative to autotroph dinocysts increased. With the increase in planktic productivity came increased productivity of benthic fauna, seen in higher benthic foraminiferal accumulation rates, and an increase in relative abundance of the diatom-consuming species *Elphidium excavatum*. The pattern started to change in the 1960s-1970s, when *Elphidium excavatum* started to decrease in relative abundance to be replaced in western LIS by the omnivorous foraminifer *Ammonia parkinsoniana*. This dramatic change may reflect a switch from nitrogen limitation to silica limitation for planktonic primary productivity in LIS, and the mass accumulation rate of biogenic silica in western LIS decreased. Changes in the dominant primary producers in LIS may have reverberated through the LIS ecosystem, possibly causing a rapid decline in important species such as lobsters. With the advance of industrial society and increasing population density around LIS also came severe pollution, including metal pollution (Cd, Hg, Cu, Zn, and Cr). The common sources for these pollutants are waste water treatment plants and local metal industries, but for Hg local sources are related to the hat making industry of Connecticut. These industries have largely left Connecticut but strongly polluted sediments on land still are eroded and transported into the Sound. Multi proxy records from estuarine cores thus can document the influence of humans on coastal environments, as well as its impact on local ecosystems.

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**Tipo seminario:** Arduino Lecture

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<b>Allegato</b>	<b>Dimensione</b>
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