

I. Long Island Sound in Perspective

A. Geography

Long Island Sound lies in the midst of the highly urbanized and suburbanized northeast seaboard, one of the most densely populated regions in the nation. It is characterized by a nearly unbroken chain of urban centers, including the country's largest city, New York City.

The watershed of the Sound drains an area of more than 16,000 square miles. It encompasses virtually the entire state of Connecticut, portions of Massachusetts, New Hampshire, and Vermont, a small area in Canada at the source of the Connecticut River, and portions of New York City, and Westchester, Nassau, and Suffolk Counties in New York state. With such an extensive drainage basin, management actions must begin in those areas most directly impacting water quality in the Sound. As a result, the specific area included in the Long Island Sound Study is much smaller than the total drainage basin, focusing on the watershed within the states of Connecticut and New York. The water boundaries of the Sound have been established at the Battery on Manhattan Island to the west and The Race to the east (Figure 1).

Unlike a typical estuary, the Sound has no major direct source of fresh water at its head. Instead, lower salinity waters enter the western Sound from the Upper Bay of New York Harbor through the East River and Harlem River tidal straits. Higher salinity waters of the Atlantic Ocean enter at its eastern end, through Block Island Sound. The largest source of freshwater is the Connecticut River, discharging into the eastern Sound. These unusual characteristics contribute to the Sound's complex circulation and mixing patterns. Furthermore, waters from outside the Sound's drainage basin that enter the Sound through its boundaries are significant sources of pollutants, underscoring the need for comprehensive, regional management.

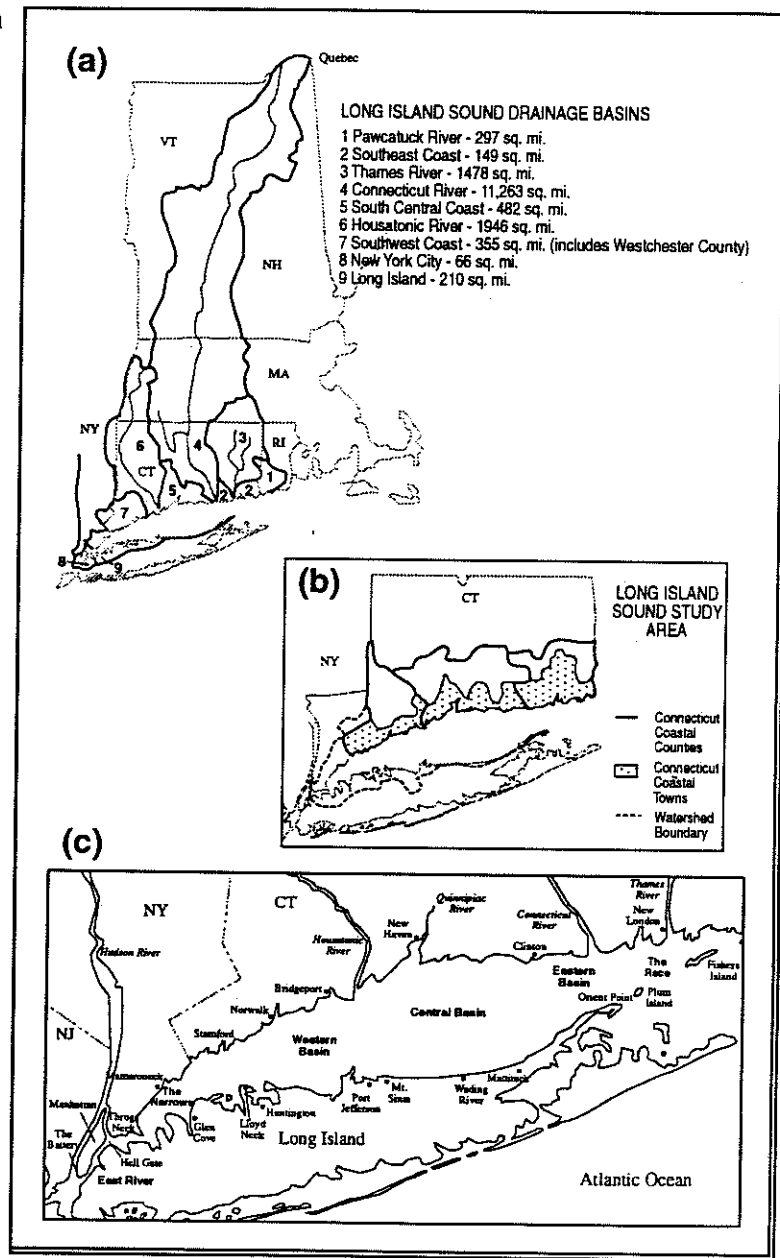


Figure 1 (a) Major drainage basins and tributaries of Long Island Sound. (b) The LISS study area. (c) Basins within Long Island Sound.

B. Ecological Importance

Estuaries are highly productive ecosystems. While the Sound has problems, it is important to note that it remains highly productive, with a great abundance and diversity of aquatic organisms and wildlife inhabiting it for part or all of their lives. Improving and maintaining water quality is critical to their continued presence and health. In addition, Long Island Sound is not an ecologically isolated estuary; it is part of the East Coast migration route, providing nesting or resting habitat for waterfowl. Fisheries of the Sound, other estuaries and the open ocean are also linked together. As such, the Sound serves as vital habitat for fish passage and as spawning grounds and nurseries. Pollution, physical or chemical obstacles, or loss of viable habitat in this waterbody can affect not only the Sound, but also the productivity of the entire system.

Important ecological components of the Sound are its diverse and distinctive habitats including tidal wetlands and flats, beaches, dunes, bluffs, rocky intertidal areas, submerged aquatic vegetation (particularly eelgrass and kelp), natural and artificial reefs, the water itself and the sediment floor of the Sound. These habitats provide feeding, nesting, and nursery areas and shelter for finfish, shellfish, plankton, birds, and other organisms inhabiting or visiting its waters. Each habitat not only supports its own community of plants and animals but contributes to the productivity of the whole Sound. All of the habitats that make up the Sound are interconnected through the food web and are integral parts of the whole.

C. Economic Importance

Long Island Sound strengthens the region's economy through the many valuable uses that it supports. Some of the uses, such as shipping, ferry transportation, electric power generation, industrial use, and waste disposal, are indirectly dependent on water quality. Others, such as tourism, fishing, boating, and beach-going clearly depend on good water quality. A few of the resources that are economically important in terms of commercial or recreational fisheries are oysters, clams, bluefish, flounder, fluke, striped bass, weakfish, and lobster.

While no one would want to assess the value of the Sound in purely economic terms, it is instructive to estimate the value for some of the significant activities that depend on good water quality. The total annual use value of commercial and recreational fishing, beach swimming, and boating for the year 1990 was estimated to exceed \$5 billion. This figure does not include the intrinsic value of the Sound as a natural resource worth protecting and preserving for future generations. Nor does it include other values that are more difficult to estimate but also contribute to the economic vitality and overall quality of the area, such as the importance of natural habitats and good water quality to nearshore residential property values.

D. Population and Land Use

The rich estuarine and woodland resources of the Long Island Sound coastal areas once supported some of the largest concentrations of Native Americans found in North America. The abundant natural resources of the area made it attractive to European settlers as well. Though both Connecticut and New York state (including Long Island) were almost entirely forested at the time of the explorer Giovanni Verrazano's arrival in the 16th century, growth in agriculture resulted in widespread deforestation of the basin by the late 1700s. By 1774, Connecticut was one of the most densely settled of any of the American colonies, with much of its population living in the shore communities and relying on agriculture and coastal trade.

Long Island Sound in Perspective

During the Industrial Revolution, the regional economy shifted from agriculture to small manufacturing and maritime trades. Factory towns sprouted along the shorelines of Connecticut and New York, reflecting the reliance on water for transportation and commerce. The mid-19th and early-20th centuries saw southwestern Connecticut coastal communities and Long Island increasingly oriented towards New York City as the center of commerce. The arrival of railroads, first on Long Island and then along the Connecticut coast, enhanced the ability of many Long Island and Connecticut cities to flourish as industrial centers. The railroads also changed many of the communities into suburbs of New York City.

The railroads both encouraged, and were encouraged by, the growth of tourism. As coastal towns and villages became accessible to residents of New York City, extensive resorts were developed along both the Connecticut and Long Island shores of the Sound. The desire to enjoy the natural beauty and recreational assets of the Sound spurred the development of summer estates for the wealthy, particularly on the northern shore of Long Island, and summer cottages and vacation houses for the middle class.

The post-World War II era brought dramatic changes to the region. The decades immediately following the war were characterized by rapid increases in population and in suburbanization. The urgent need for inexpensive land, suitable for development, resulted in the conversion of agricultural lands and the filling of wetlands for suburban housing. As agriculture diminished, forest regrowth occurred, particularly in Connecticut.

The present distribution of human population within the Long Island Sound basin is very uneven, reflecting the distribution of manufacturing centers as they developed in the 1800s and early 1900s. Of the approximately 8.4 million people living in the basin, New York City, which makes up only about 0.4 percent of the land area, has about 42 percent of the population. Westchester, Nassau, and Suffolk Counties, with 2.1 percent of the land area, contribute 8.3 percent of the population and Connecticut, with 33 percent of the basin, has 37 percent of the population. Vermont, New Hampshire, and Massachusetts comprise the remaining 12.7 percent of the population in the drainage basin.

The population growth rate in the Connecticut and New York state portions of the Long Island Sound basin has declined significantly in recent decades. After rapidly expanding by 78 percent between 1940 and 1970, population growth has slowed to an increase of 1 percent between 1970 and 1990. Future population growth is expected to be about 4.1 percent (300,000 people) between 1990 and 2010 and 6.4 percent (500,000 people) over the period from 1990 to 2030.

E. Water Quality

In the two decades since the passage of the Clean Water Act, water pollution control programs have resulted in measurable improvements in water quality. The current value and quality of the Sound are partly the result of the investments in water pollution control programs since the passage of the Clean Water Act, in spite of ever-increasing numbers of people and activities on the Sound and within its watershed. Obvious sources of pollution are now regulated and controlled through permit programs, tidal wetlands are protected, and major efforts in the states of Connecticut and New York to build sewage treatment plants and control industrial discharges have helped to restore degraded waters.

Long Island Sound Study

These efforts have taken place because of increased awareness and concern among citizens and the responsiveness of public officials. Without the substantial investment already made in environmental protection, the value of the Sound would be far less than it is today.

Despite the significant progress made in solving many water quality problems, much work remains before the goals of the Clean Water Act to *restore and maintain the chemical, physical, and biological integrity of the nation's waters*, so they are *fishable* and *swimmable* are met in all of the Sound. The quality of Long Island Sound is still far from what it should or can be. Many of the uses or values of the Sound are still impaired from old abuses. Other uses or values face new threats. Residential, commercial, and recreational development have altered land surfaces, reduced open spaces, and restricted access to the Sound. The density of people living within the Sound's watershed increases with proximity to the coastline. This development has dramatically increased the use of the Sound as a place to dispose of human and other wastes. More than 60 public wastewater treatment plants discharge more than one billion gallons of treated effluent into the Sound each day. The paving over of the land has increased runoff and reduced the filtration and processing functions of natural landscapes. Habitat destruction and alteration throughout the watershed have harmed native wildlife populations and reduced the breeding grounds and nursery areas for a variety of species.

These and other problems require new approaches to protect and preserve Long Island Sound and to provide access for the public use and enjoyment.