

Storms and Climate Change in Long Island Sound

By Malcolm J. Bowman and Jay Tanski

Long Island Sound is typically exposed to two major types of storms; the winter nor'easter and the hurricane. Although hurricanes can be devastating to Long Island's coastal communities, it is the nor'easter that typically causes the most flooding and erosion damage. Nor'easters are large, low pressure systems that are formed over the North Atlantic Ocean during the winter months. Typically they last several days, but may persist as long as a week. Although winds associated with nor'easters are not as strong as those of hurricanes, nor'easters linger much longer and can cause more damage. A nor'easter storm may last through several high tides, leading to repeated opportunities for serious coastal flooding and erosion.

Hurricanes are a very different phenomenon than the nor'easter. They are generated in the tropical Atlantic Ocean during the hurricane season, which runs from late August through October in this area. The hurricane's heat engine, which fuels the formation, growth and the journey of the storm up the east coast, is derived from the warm surface waters of the Atlantic. Hurricanes grow and thrive only when they are traveling over the ocean. Once landfall occurs, they slowly diminish in fury and eventually dissipate.

Many people are concerned about the impact global climate change may have on storms in Long Island Sound. While evidence for global warming is strong, how this warming may impact other phenomena like storms is much less certain. Some research indicates that hurricanes may intensify due to higher sea surface temperatures that are associated with global warming; another recent study suggests that warming could actually reduce the strength of hurricanes likely to make landfall in the U.S. So, researchers are still seeking scientific consensus on how warming may affect the number of hurricanes. Unfortunately, even less is known about how climate change may influence nor'easters. Clearly, this is an area where more study is needed.

In the future, sea level rise may lead to increased flooding during storms. Sea level in the Sound has been rising at about one foot per century for the last 8,000 years or so. According to NASA predictions, sea level may rise two to three feet by the end of this century, due to warming and other factors. This increase is considerably less than the storm surges of eight feet or more experienced now and will occur over a much longer time frame, but this slow rise will eventually increase the frequency and extent of flooding due to storm surges in low lying areas around the Sound.

While the exact effect of climate change on storms remains uncertain, global warming will exacerbate problems we are already facing. The weather and climate will become more variable, which will make it more difficult to plan. To be prepared, we should focus on identifying the most vulnerable areas of our coast and developing appropriate hazard mitigation strategies based on a quantitative understanding of the forces acting on the shoreline and their specific impacts. Proper management may mean doing nothing in some areas (uninhabited or with exceptionally high erosion rates); in other areas the use of "soft engineering" techniques (such as beach nourishment) may be appropriate, in others "hard engineering" structures such as storm barriers may be warranted depending on the use and development of the shoreline and the physical processes operating there. Research and monitoring efforts should focus on climate change science in all its implications. This would include storm surge and coastal erosion, as well as shifting baselines in weather, ecology, water quality issues, coastal planning, building codes, commercial and residential construction practices and coastal protection structures.

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