THE FUTURE - SOME EMERGING TIDAL WETLAND ISSUES

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On the surface, tidal wetlands appear to represent a simple type of ecosystem but, since they occur at the land/water interface, they actually operate under the complexities of both environments. Furthermore, while tidal wetlands are among the best studied ecosystems on the globe, our knowledge of them is far from complete. Below are just some of today's emerging scientific questions and management issues.

Sea Level Rise

Sea level rise is now occurring at an accelerated rate, probably in response to degradation of air quality caused by greenhouse gases. This results in global warming, and as temperatures rise, the polar ice caps continue to melt. Some coastal states have reported subsidence or drowning (loss) of tidal wetlands which can no longer accumulate peat fast enough to stay above sea level. In Connecticut, the effect depends on location. Sea level rise appears to be altering the zonation of plant communities in southeastern Connecticut, where the tidal range averages 0.75 meters. Here studies have documented that at least two marsh systems are currently not keeping up with sea level rise. Studies at Connecticut College also suggest that as sea level rises, marsh productivity decreases. On Connecticut's western shore, with a tidal range of up to two meters, extensive areas of low marsh vegetation have been drowned (e.g. Fivemile River, Norwalk). These losses are most likely due to sea level rise. Monitoring of sea level rise and its implications for tidal wetlands need to be expanded throughout Long Island Sound.

Another ramification of sea level rise is the tendency for marsh systems to migrate landward. As sea level rises, marshes which are able to stay above the rising water level will tend to move inland. For insensitively developed areas where seawalls, lawns and other structures occur to the very edge of the wetland, landward movement is severely limited (Fig. 1). An important question

Fig. 1 Marshes with development right to their edge have no place to go as sea level rises. (DEP OLISP)

for land managers is how to achieve sustainable development that allows for continued human use of the coastal fringe while also accommodating continued marsh development.

Spread of Phragmites (*Phragmites australis*)

Perhaps the most significant problem confronting tidal wetlands, especially those with limited tidal flushing or low salinity waters, is the conversion of Spartina dominated marsh communities to Phragmites or Common Reed (Fig. 2). On the lower Connecticut River, this invasion appears to have begun in the 1960s and today it is spreading at a rate of 2 % per year. There is some evidence to suggest that the invasive form is not indigenous to North America and may have established here by means of seeds on ballast stones from ships, the documented path for establishment of other exotic plants. Research into the genetic characteristics that can identify native versus non-native Phragmites types may help formulate control strategies. Its rapid invasion of the tidal wetlands of the lower Connecticut River, many of which have been designated as

Fig. 2 Phragmites in flower. (W.A. Niering)

"wetlands of international importance," is one of the single greatest habitat management issues on the river. The Department of Environmental Protection (DEP) is beginning to evaluate methods to control this grass along the Connecticut River.

Stormwater Discharge

The traditional approach to land development has been to collect stormwater and direct it through a pipe to the nearest natural watercourse, often a wetland. Throughout the country, few regulatory programs consider the dilution effect of stormwater when such waters are discharged into estuaries and, specifically, tidal wetlands. Connecticut's DEP recognized that stormwater discharges into tidal wetlands were contributing to the spread of Phragmites through changing wetland elevations (i.e. deposition of sediment) and dilution of soil salinities. Presently, DEP requires new and existing stormwater systems to retain the runoff generated by a one-inch rainfall event. The purpose of this is to prevent chronic dilution and the deposition of sediment by high frequency, low volume storm events. While it is apparent that such discharges are adversely affecting the marsh vegetation, no studies have been done to evaluate the impacts upon associated animal populations.

Harvesting of Marsh Grasses

The harvesting of grasses from the salt marsh is an activity that has occurred since colonial time. Only recently have scientists begun to examine the consequences of haying upon the wetland ecosystem. The first concern is that this activity removes a significant portion of organic matter that would otherwise be accumulated at the soil surface, thus adding to marsh elevation, a vital process in keeping up with sea level rise. Modern day farmers often use conventional farm equipment which is not designed for use on the compressible salt marsh soils and often leads to the creation of ruts and increased mosquito breeding. Such depressions have been known to persist for years and even decades.

SUGGESTED READING

Nydick, K.R., A.B. Bidwell, E. Thomas, and J.C. Varekamp. 1995. A Sea-level Rise Curve From Guilford, Connecticut, USA. Marine Geology 124: 137-159.

Warren, R.S. and W.A. Niering, 1993. Vegetation Change on a Northeast Tidal Marsh: Interaction of Sea-level Rise and Marsh Accretion. Ecology 74(1): 96-103.