

Effects of nutrients and carbon loadings on communities and ecosystems

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ABSTRACT

Waters of the Hudson River estuary and the New York Bight apex experience unpleasant and costly ecological problems that are caused, in part, by excessive inputs of nitrogen and carbon from shore-based sewage discharges. A principal problem is summertime depression and localized depletion of dissolved oxygen in the estuary and bottom waters of the apex. In the estuary, decay of organic matter (carbon) from sewage and runoff, and from phytoplankton blooms stimulated by nitrogen from sewage, reduce dissolved oxygen to levels insufficient for diverse and abundant populations of typical estuarine organisms.

Most of the nitrogen discharged into the estuary is flushed into surface waters of the apex, where it is assimilated by coastal phytoplankton in an area of up to 1,350 km² (late winter and early spring). Organic matter produced by this excess growth, coupled with appropriate oceanographic conditions, may contribute to episodes of oxygen depletion in limited portions of apex bottom waters. Oxygen-demanding materials from sludge dumping do not appear to contribute greatly to oxygen depletion. The large-scale anoxic episode of 1976 was not caused by these inputs.

A large-scale reduction in nitrogen input (*i.e.*, >90%), especially in the summer, might alleviate low oxygen episodes in the estuary and apex, but would not prevent the kind of episode that occurred in 1976. Nutrients other than nitrogen and toxic materials may encourage the growth of some species and inhibit others, depending on location and time of the year. It is still unclear what changes might result from controlling these substances.

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