

Sustainable Oyster Aquaculture in Coastal Ecosystems for Optimal Management of Nutrient-Loading

Worku T. Bitew

State University of New York, Department of Mathematics, Farmingdale, NY, USA

Richard Vogel

State University of New York, School of Business, Farmingdale, NY, USA

Abstract:

Excess nitrogen and other pollutants have been a concern in New York and Connecticut's coastal waters for nearly 40 years. New York and Connecticut in 2001 established a plan to reduce overall nitrogen pollution in Long Island Sound (LIS) by 58.5 percent. The plan, called the Total Maximum Daily Load (TMDL), was approved by the Environmental Protection Agency (EPA) in 2001. The TMDL was updated in 2015 with input from stakeholders. Commercial bioremediation represents a new potential path forward to remedy nitrogen eutrophication, changing the incentive structure from one rooted in government subsidization and directed actions to reduce nitrogen pollution into the sound to one that relies on private producers engaged in a for-profit enterprise. The commercial cultivation of various shellfish species like Oysters native to waters of the LIS has been suggested as one possible strategy to address the nitrogen issue. Utilizing a dynamic optimization model, our research presents a possible path to address nitrogen eutrophication at targeted reduction levels while balancing government expenditures and subsidization against potential for-profit aquaculture production by private producers.