

# NUTRIENT BIOEXTRACTION



## WHAT IS NUTRIENT BIOEXTRACTION?

Nutrient bioextraction (also called bioharvesting) is the practice of farming and harvesting shellfish and seaweed for the purpose of removing nitrogen and other nutrients from natural water bodies.

## WHY DO WE CARE ABOUT NITROGEN?

Eutrophication has been identified by scientists as one of the most serious threats to coastal environments around the world. Reducing nutrient inputs is a top priority for many estuary programs in the United States, including Chesapeake Bay, Long Island Sound, and Great Bay. By reducing nutrients in coastal waters, states and federal agencies hope to reduce widespread and recurring problems with algal blooms, loss of seagrass, and hypoxia.

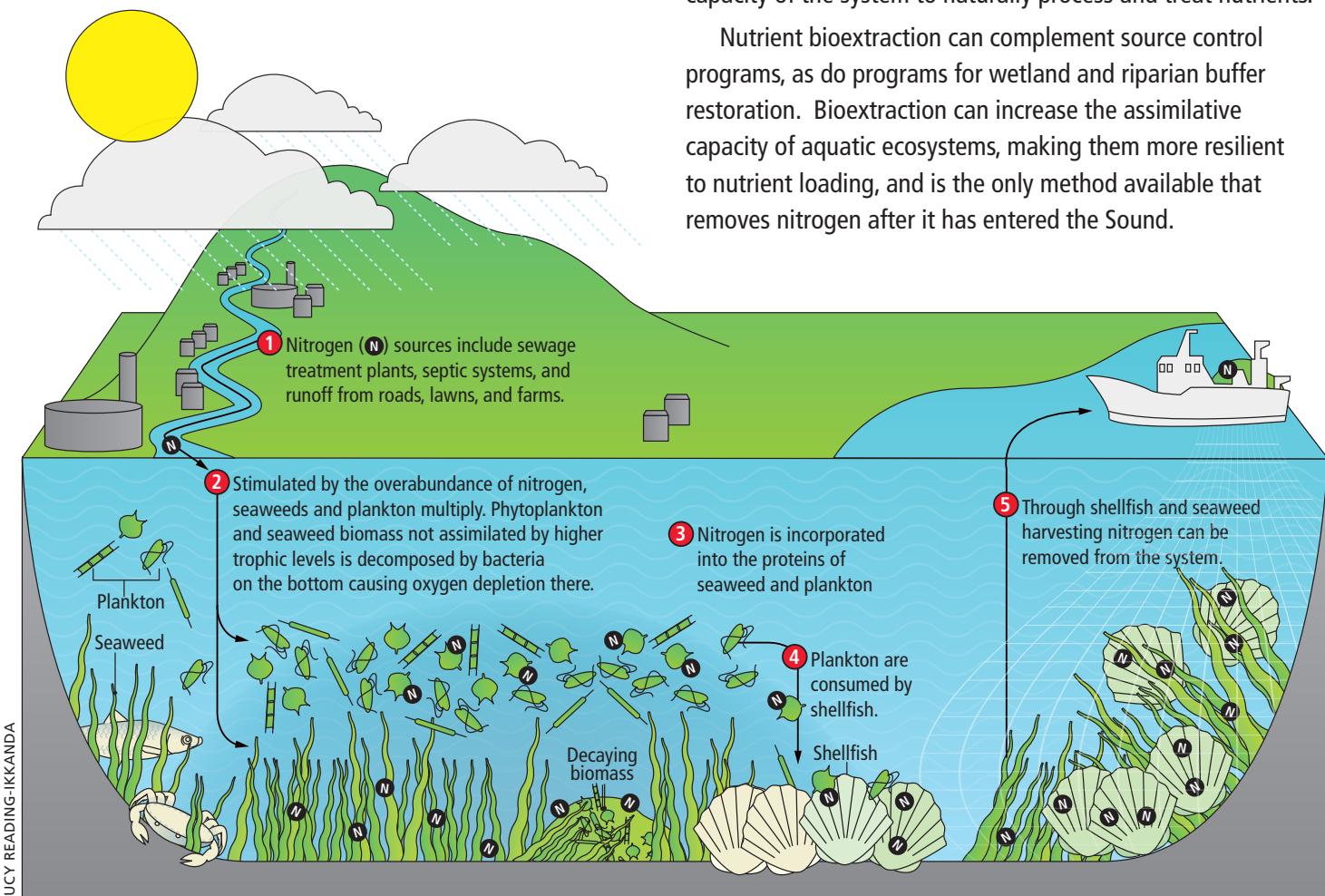
## HOW HAVE WE BEEN REDUCING NITROGEN IN LONG ISLAND SOUND?

Since the 1990s, the Long Island Sound Study partners have invested hundreds of millions of dollars to reduce the amount of nitrogen discharged into the Sound and its watershed by upgrading wastewater treatment plants. National treatment standards do not require the breakdown and removal of nitrogen from sewage effluent. Other sources of nitrogen, such as fertilizer and pet waste, have also been targeted by communities around the Sound.

## WHY DO WE NEED NUTRIENT BIOEXTRACTION?

Efforts to control nutrient sources have reduced the amount of nitrogen entering the Sound each year. However, changes in the Sound and its watershed, such as wetland loss and decreased populations of filter feeders, have diminished the capacity of the system to naturally process and treat nutrients.

Nutrient bioextraction can complement source control programs, as do programs for wetland and riparian buffer restoration. Bioextraction can increase the assimilative capacity of aquatic ecosystems, making them more resilient to nutrient loading, and is the only method available that removes nitrogen after it has entered the Sound.



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## How Are We Exploring Nutrient Bioextraction In Long Island Sound?

### 1 WORKSHOP

In 2009, the Long Island Sound Study held a workshop to learn more about topics related to nutrient bioextraction from experts around the world and to discuss opportunities for nutrient bioextraction in Long Island Sound.



### 2 RIBBED MUSSEL AND SEAWEED PILOT STUDY

Planning is underway for a 2011 study to grow ribbed mussels and two types of seaweed off of Hunts Point in the East River to test the effectiveness of these organisms in removing nitrogen from the local environment.



### 3 MODELING AND ECONOMIC WORK

Preliminary model runs indicate that implementing nutrient bioextraction on a large scale could reduce hypoxia in Long Island Sound.

Further evaluation of bioextraction is needed as part of a systems approach that integrates watershed load reduction programs with enhanced nutrient processing to attain water quality standards, restore designated uses, and restore ecosystem services. EPA's Regional Ecological Services Program is supporting a two-year study in collaboration with the NOAA Center for Coastal Monitoring and Assessment and National Marine Fisheries Service Milford Laboratory to further evaluate the role of bioextraction in the nutrient budget within Long Island Sound and Great Bay, NH using farm scale and system scale modeling to evaluate relevant direct (e.g. recreational) and indirect (e.g. water quality) ecosystem services and products (e.g. shellfish product for consumption) related to shellfish aquaculture. Preliminary results suggest that this bioextraction complements traditional nutrient reduction measures. It is anticipated that the success of this pilot study will be helpful for nutrient management in places other than Long Island Sound and Great Bay, NH.

### FOR MORE INFORMATION

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