HUMAN-FACILITATED BIVALVE POPULATIONS EFFECT ON ENERGY AND NITROGEN FLOW THROUGH MARINE ECOSYSTEMS

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Eutrophication, the increased supply of organic matter to a system, is often attributed to excess nutrient inputs and can lead to detrimental effects such as low oxygen and habitat loss. However, coastal sediments harbor microbial communities capable of transforming bioavailable nitrogen into inert gas (i.e. denitrification), thus potentially mediating eutrophication. For example, filter-feeding bivalves have been recognized as important facilitators of nitrogen removal by enhancing denitrification in sediments. This talk will explore controls on this critical microbial metabolism using clam aquaculture as a model system. Surprising results showed that, on a local scale, high densities of clams can be a source of nitrogen by facilitating nitrogen recycling and promoting dissimilatory nitrate reduction to ammonium (DNRA), a microbial pathway that competes with denitrification. Depending on the ultimate source of phytoplankton supporting the cultivated bivalves, these filter-feeders may serve as a noncanonical bottom-up control on primary production on a local scale. Since denitrification removes nitrogen while DNRA recycles it, understanding what controls the partitioning between these microbial pathways and how this dynamic may shift in response to changes such as organic matter input, nutrient addition, or salinity is essential to predicting how key ecosystem services will change over time. This is one example where suspension feeders have tremendous influence on these microbial nitrogen transformations, resulting in dramatic shifts in the energy flow through the ecosystem. Another example where anthropogenic activity may result in changes to populations of benthic filter-feeders is the development of offshore wind. The talk will conclude by discussing how shifts in the benthic community associated with the introduction of wind turbine foundations as novel structures may have large impacts to the energy flow of both the pelagic and benthic compartments of the northwest Atlantic outer continental shelf.

PRESENTER BIO: Dr. Murphy is an ecosystem ecologist interested in the response of marine systems to environmental change and anthropogenic stressorss. Her work focuses on understanding controls on the biogeochemical cycling of nutrients and carbon in sediments. She is a senior scientist working on projects monitoring and remediating organically-enriched systems.