WORKING WATERFRONTS WORKING FOR YOU: USING SHELLFISH AQUACULTURE FOR WATER QUALITY RESTORATION

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Anthropogenic impacts on ecosystems, especially habitat loss and impaired water quality, continue to warrant restoration efforts in estuaries worldwide. Restoration of certain species can improve estuarine health and mediate negative impacts by improving water quality and providing other ecosystem services. Many coastal states are interested in incorporating shellfish (clams and oysters) aquaculture into water quality restoration plans because there is compelling evidence that shellfish can reduce and remove nitrogen (N). Shellfish can serve as N removal 'hotspots' by transferring nutrients in phytoplankton to sediments, resulting in denitrification, the microbial-mediated conversion of harmful nitrogen to harmless nitrogen gas. Florida recently approved restoration leases, where shellfish can be planted exclusively to support ecosystem restoration, including water quality improvement. Yet, data on denitrification from Florida shellfish are noticeably lacking, despite Florida ranking 5th in the nation for bivalve shellfish aquaculture and where many estuaries suffer from N pollution. We conducted sediment sampling at commercial-scale oyster (*Crassostrea virginica)* and clam (*Mercinaria mercinaria)* aquaculture farms in the Big Bend and Tampa Bay regions to determine how differences in species, locations, and husbandry practices influence the effectiveness of shellfish aquaculture at removing nitrogen. We compared sediments from shellfish farms to control sediments without aquaculture influence to determine the net effect of shellfish aquaculture on sediment N cycling. Oysters and clams increased denitrification in Tampa Bay but did not affect denitrification in the Big Bend. The effect of shellfish on denitrification is likely due to increased organic carbon load to the sediments from shellfish biodeposition, but since control sites and shellfish sites had similar organic matter content in the Big Bend, the effect was muted. Our results highlight the importance of shellfish in coastal N cycling but suggest that site-specific environmental conditions should be considered when developing guidelines for using shellfish aquaculture for water quality restoration.

PRESENTER BIO: Dr. Smyth is an Assistant Professor in the Soil, Water, and Ecosystem Sciences Department located at the Tropical Research and Education Center. She is a biogeochemist, studying how human activities impact the transformations and fate of nutrients in coastal ecosystems.