Benthic Algae in Lake Erie: Past, Present and Future.

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Primary productivity of most lakes is benthic algal driven. The Great Lakes, because of their size, are an exception. Yet, benthic algae play a critical role in the littoral zone of Lake Erie and changes in littoral trophic webs have consequences for the entire lake. Pre-European Lake Erie supported a robust and diverse benthic algal community. Cladophora, an important benthic filamentous green alga, was common but not over-abundant at this time. In the late 19th and early 20th centuries changes in Lake Erie's water quality led to changes in the quantity and quality of benthic algae in the littoral zone. Increased phosphorus resulted in phytoplankton proliferations that reduced light penetration. Phosphorus loading also stimulated massive growths of Cladophora in the upper littoral zone. Much of this production was exported to deep basins where it stimulated decomposers deoxygenating the hypolimnion. As phosphorus controls were implemented in the 1970s and as zebra mussels invaded in the 1980s Lake Erie phytoplankton levels declined, light penetration increased and the benthic algal community shifted away from Cladophora blooms to a rich diverse community. Today, the benthic algal community plays an important role in littoral zone food webs and in benthic-pelagic trophic links. New exotic benthic fish are capitalizing on the benthic algal-driven food web. Predictions for a new equilibrium are difficult since anthropogenic changes in Lake Erie continue. Activities that shift the competitive advantage between phytoplankton and periphyton have profound implications for trophic pathways in Lake Erie.