

Opening the black box: evaluation of nutrient nonpoint source management for estuarine watersheds.

Lauri Green, Caitlin White, Cheryl Brown

Over the last 40 years, there have been significant improvements in water quality and ecosystem condition in estuaries stressed by nutrient enrichment. However, documented improvements have been largely attributed to reductions in point sources. In contrast, improvement of coastal condition through NPS management has had limited evaluation. Though NPS management plans have been in place for decades, relatively few coastal systems have sufficient data to quantify changes in ecosystem condition. To evaluate the issue, we examined the call to action, regulatory tools, best management practices (BMPs), water quality, macrophyte and macrobenthic indicator responses in 6 coastal systems where point sources contributed less than 30% to nutrient loading: Newport Bay (CA), Robert's Bay (FL), Great Bay (NH), Barnegat Bay (NJ), Indian River Lagoon (FL) and Peconic Estuary (NY). Water quality and macrophyte responses were related to the time since the implementation of BMPs targeting NPS of nutrients. Newport Bay, which has been addressing NPS of nutrients since 1985, had a 100% reduction of nuisance macroalgal blooms while seagrass area increased by a factor of 8. Though Numeric Nutrient Criteria were developed in 2010 but not adopted, load reductions in Great Bay have reduced dissolved inorganic nitrogen concentrations approximately 47% from 2006-2011. In contrast, the Peconic Estuary has implemented few BMPs and seagrass has disappeared from many sites. It is clear that the greatest gains were made in systems where there were both sufficient regulatory authority to impose load reductions and adequate financial incentives to implement BMPs. Moreover, climate may play an important role in attaining or exceeding nutrient targets, suggesting that climate change models should feature prominently in NPS management.