

## **DEVELOPING AND APPLYING INDICATORS OF HUMAN- AND CLIMATICALLY-INDUCED CHANGES IN ESTUARINE AND COASTAL WATER QUALITY**

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More than half the US and world population resides within 100 km of the coast and the absolute numbers and proportions of human inhabitants of coastal watersheds are steadily increasing. The impacts of human encroachment are evident in estuarine and coastal waters that process a bulk of land-based nutrients and other pollutants. These ecosystems are under the influence of both human and natural perturbations such as major storms, hurricanes and flooding, which may coincide and act synergistically or antagonistically. The US Atlantic coastal region has seen its share of ecological change in coastal watersheds, with human development and no less than 7 major hurricanes coincidentally-impacting this region in the past 7 years. Distinguishing and integrating the impacts of natural and human stressors in time and space are difficult but essential for understanding environmentally-driven change of biodiversity and function, starting at the microbial indicator level. Here, we explore the complementary use of analytical (HPLC detection of diagnostic photopigments), trophic structure (food web size spectral analysis), geomorphological, physiological and molecular indicator tools coupled to remote sensing to characterize microbial and higher trophic level community structural and functional responses to a variety of anthropogenic and natural physical-chemical perturbations. These tools can be adapted to automated surveys by ferries, synoptic monitoring, and remote sensing in order to evaluate environmental controls on biotic community structure and function over ecosystem to regional scales. Applications of these indicators to research and management (e.g., TMDL development) of estuarine and coastal systems varying in size, water residence time (flushing rates) and trophic current state can be found on the EPA-STAR Atlantic Coast Environmental Indicators Consortium (ACE INC) website, [www.aceinc.org](http://www.aceinc.org). Barnegat Bay/Little Egg Harbor and Mullica River Great Bay Systems fall well within the range of systems amenable to the use of these indicators.

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