Analyzing the historical Hudson River Biological Monitoring Program to develop an integrated program for long-term monitoring of Hudson River ecosystem dynamics

Dr. Yong Chen, Professor of Marine Science, School of Marine and Atmospheric Sciences, Stony Brook University, Email: yong.chen.2@stonybrook.edu, Tel: 631-632-3187

Abstract

The Hudson River (HR) ecosystem provides critical habitats for many key fish species of economical, ecological and social importance in the northwest Atlantic. Like many ecosystems in the regions, the HR ecosystem has been experiencing large changes over the last several decades under multiple stressors induced by climate changes and anthropogenic activities. Hudson River Biological Monitoring Program (HRBMP), dated back to the 1970s with all the data and samples donated to Stony Brook University in 2019, targets early life history stages of fishes and water quality which have not been fully evaluated and analyzed, but can provide a unique opportunity to evaluate long-term changes in the HR ecosystem and identify how changes are influenced by environmental and anthropogenic drivers. The HRBMP was terminated in 2020 after the closure of the Indian Point Nuclear Power Station in Hudson River, resulting in loss of our ability in monitoring the changes of this important ecosystem in a very dynamic time period. We propose to analyze the historical HRBMP data and samples that are denoted to Stony Brook University and curated by the PI to develop a next generation of integrated monitoring program, HRBMP-II.

As envisioned, the HRBMP-II would be an integrated and adaptable ecosystem monitoring program that can detect gradual and abrupt shifts in physical, chemical, and biological drivers, and the system's responses to them, across multiple trophic levels. The HRBMP-II would provide the data and samples needed to identify ecosystem threats, understand impacts of existing and emerging stressors, and inform and evaluate management decisions. HRBMP-II will be a perfect candidate for the NSF Long Term Ecological Research (LTER) Program. NSF established the LTER program in 1980 to address ecological questions that cannot be resolved with short-term observations or experiments. This program supports the research located at specific sites chosen to represent major ecosystem types or natural biomes. It emphasizes the study of ecological phenomena over long periods of time, which are essential to achieve an integrated understanding of how populations, communities and other components of ecosystems interact as well as to test ecological hypotheses/theory. In particular, the NSF LTER Program is currently interested in adding the ecosystems with significant urban impacts in their network. The HR ecosystem is a unique aquatic ecosystem with large gradients in environmental drivers and anthropogenic activities, and will be a perfect fit to the NSF LTER Program. The study will greatly improve our understanding of the HR ecosystem, leading to the development of predictive modeling tools for quantitative evaluations of possible impacts of changes in the HR.