

Evaluating Ecosystem Services Provided by the Albemarle-Pamlico (NC) Estuary System in Response to Watershed Nitrogen Management

The Albemarle-Pamlico Watershed and Estuary Study (APWES) is part of the USEPA Ecosystem Services Research Program. The mission of the APWES is to develop ecosystem services science to inform watershed and coastal management decisions in the Albemarle-Pamlico watershed and estuary. Due to the substantial body of regional scientific research, the watershed is an excellent area to examine the effects of multiple pressures on high value resources and services. Initially, research will seek to understand how reactive nitrogen (Nr) management influences seven ecosystem services (clean air; clean water; climate resilience; flood and storm protection; food, fiber, and fuel; recreation; and biodiversity). Nr loading is expected to increase due to future growth in human population density and agricultural production. This study uses the DPSIR (Drivers-Pressures-State-Impact-Response) framework to address the consequences of nitrogen management decisions in the watershed. A systems-based approach will estimate the contributions of the many sources of nitrogen to the watershed and understand relationships between Nr loading, transformation, and transport from upland ecosystems to coastal estuaries.

APWES research has three components: 1) Mapping and Monitoring, 2) Modeling, and 3) Decision Support Tool development. Mapping and monitoring projects will quantify ecosystem services, drivers and pressures to the system. Modeling projects will relate changes in drivers and pressures to changes in ecosystem services. Modeling research will include both empirical and mechanistic models for the airshed, watershed, and estuary. Decision support tools, including an interactive web-based software application and Bayesian networks, are being developed with the State of North Carolina, the Albemarle-Pamlico National Estuary Program and local stakeholder input to understand how watershed management decisions alter services within the estuary and to simulate scenarios of future changes.