

STRIVING FOR BALANCE IN THE NARRAGANSETT BAY WATERSHED: EPA'S TRIPLE VALUE SIMULATION (3VS) MODEL

The Big Picture

Narragansett Bay is one of New England's most precious resources. The Bay is the largest estuary in the region – where fresh water from rivers and streams meets the salt water of the Rhode Island Sound. It is a spawning ground, nursery, and habitat for thousands of species and a playground for recreational activities like swimming and boating. The Bay-related tourism industry supports tens of thousands of jobs in the region, including the \$100 million recreational fishing industry – all dependent on the health of the Bay.

The health and vitality of many watersheds are jeopardized by excessive releases of nutrients – primarily nitrogen and phosphorus – from sources including agriculture, wastewater treatment, and stormwater runoff. The same is true of Narragansett Bay.

Elevated nutrient levels in the region threaten the health of the Bay and cause algae blooms that can degrade or destroy the aquatic ecosystems and interfere with fishing, recreation, and tourism. While nitrogen is necessary for all life, too much of it can have negative impacts. Burning of fossil fuels, land clearing, deforestation, agricultural use of fertilizer, wastewater, and stormwater runoff have all contributed to nitrogen overload, which has doubled since the 1940s.



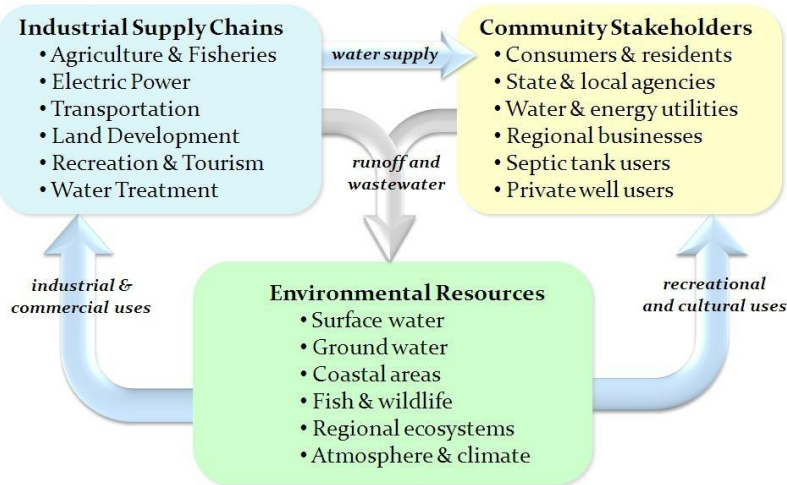
To ensure Narragansett Bay is a healthy resource for community well-being and economic prosperity in the region, EPA is collaborating with many government and non-government partners to explore possible strategies, such as septic and sewage treatment technologies, combined sewage overflow reductions, bio-harvesting, and green residential and commercial infrastructure. Analysis of the solution strategies includes not only affordability and effectiveness, but also the potential for indirect consequences, including costs or benefits related to air pollution, energy use, and employment.

Simulating Strategies to Reduce Nutrient Impairment

The Narragansett-Triple Value Simulation (3VS) is a very high-level working model based on a systems approach that accounts for the complex relationships among economic, social, and environmental systems.

The model is specifically designed to help policy makers and regional stakeholders explore a variety of cause and effect scenarios and investigate a variety of solutions to improve the health of the Bay in the face of growing population and climate change.

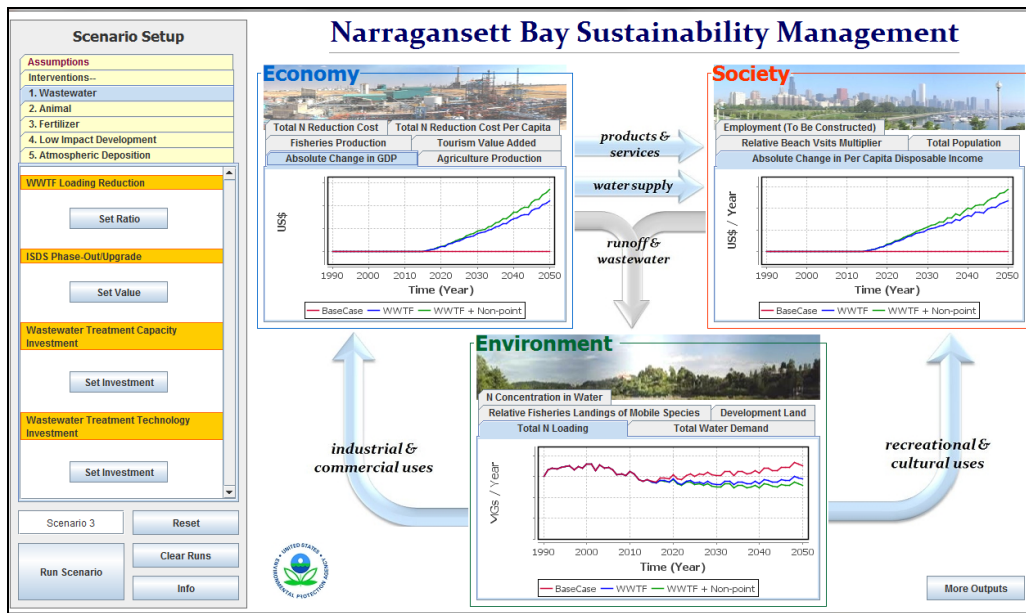
The goal of the simulation tool is to inform decisions used to achieve a balanced water resources management system that will support environmental, economic, and social sustainability. By modeling the full nutrient cycle, as seen in the graphic below, the simulation helps to identify solutions that will protect ecosystem integrity while providing the water resources that are essential for continued economic prosperity.



3VS Model Applications

The model features a user-friendly, dashboard-style graphical interface that allows users to explore and evaluate different scenarios (see figure below). The left control panel allows users to specify scenarios of interest, such as reduction in nitrogen loadings from specific treatment plants. On the right a series of output graphs estimate the changes in outcomes over time, including economic indicators such as employment and fishery production, social indicators such as beach visits, and environmental indicators such as phytoplankton levels.

Multiple scenarios can be created easily and then compared visually in the model. EPA plans to customize the model to address nutrient impairment issues in other sensitive watersheds across the country.



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