LAND-ESTUARY COUPLINGS: MECHANISMS AND TOOLS TO ASSESS MANAGEMENT OPTIONS TO REMEDIATE NITROGEN LOADINGS

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Management of increasing anthropogenic eutrophication will require adequate methods to quantify sources of nitrogen. We developed and verified two models, NLM estimates the nitrogen load delivered to estuaries (Valiela et al. 1997, 2000) and ELM estimates the nitrogen concentration in the estuary water (Valiela et al. in press). To make these nitrogen loading models easily accessible for stakeholders, managers, decision makers, and researchers interested in estimating or managing nitrogen loads, we developed the web-based tool NLOAD. NLOAD includes NLM and ELM as well as models developed in Gaines 1986, Cole et al. 1993, Johnes 1996, Kellogg et al. 1996, Caraco and Cole 1999, Costa et al. 1999, and Dettmann 2001. The models included in NLOAD have relatively simple expressions, they require modest data input, and are potentially broadly applicable. This is crucial for ready application of NLOAD, because in the vast majority of cases where eutrophication is a problem, users will have only a limited data base to use as inputs. To assure ourselves that the simpler models were able to produce realistic predictions, we carefully validated the models versus a set of data for various estuaries (Valiela et al. 2002). Access to the validation and comparison efforts is also available by appropriate options in NLOAD.

Management Implications:
NLOAD can be applied to carry out several types of estimations about sources and transformations affecting land-derived N loads to estuaries such as Barnegat Bay. These include the N load from a watershed to a receiving water body, the contributions to N load from wastewater, fertilizer, and atmospheric deposition, and the mean annual concentration of N in an estuary. As an example, we will report estimates of land-derived N entering Barnegat Bay. There is also a management module in NLOAD that allows the user to manipulate their data set to determine the effects of various management options.

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