Chesapeake Bay Modeling Laboratory Recommendation

Modeling Laboratory Action Team Report

Chesapeake Bay Program

Science. Restoration. Partnership.

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I. Executive Summary

The Chesapeake Bay Program (CBP) Management Board formed the Modeling Laboratory Action Team in response to a recommendation from the National Research Council (NRC) of the National Academy of Science (NAS) in the report, "Achieving Nutrient and Sediment Reduction Goals in the Chesapeake Bay: An Evaluation of Program Strategies and Implementation".

"Establishing a Chesapeake Bay modeling laboratory would ensure that the CBP would have access to a suite of models that are state-of-the-art and could be used to build credibility with the scientific, engineering, and management communities."

The Modeling Laboratory Action Team (MLAT) was charged with developing a definitive set of implementation options. Specific elements of the charge included:

1) Evaluating other existing modeling laboratories and adaptive management programs that encompass modeling to document how those programs function and how applicable their structures and mandates are to the CBP Partnership.
2) Considering the range of options for structuring a Chesapeake Bay Modeling Laboratory (CBML), a virtual laboratory, or responsive program reorganization that is capable of carrying out the functions outlined by the NRC committee and addressing the series of existing Scientific and Technical Advisory Committee and the jurisdictions' recommendations on modeling.
3) Developing options and recommendations for institutional sponsorship and laboratory functions and assessing the possible financial investments and funding mechanisms.

MLAT agreed upon 11 Guiding Principles for the CBML:

1) Research, development, and operations must all be addressed
2) Sustainable dedicated core funding
3) Research and development is management focused
4) Research must be of publishable quality and should be peer reviewed
5) Formal methods to track and openly distribute model input data and products of the data (with meta data meeting accepted standards) must be included
6) Consider both regional and local issues across the watershed and estuary
7) Supports development of open-source, modular code
8) Transparency and communication should be considered in development and operations
9) Support development of a suite of models to support Chesapeake Bay modeling needs
10) Transferability
11) Regional focus with the ability to expand

MLAT identified four essential functions of models that must be integrated to provide the highest possible scientific credibility and confidence.

Operations: the rapid and automated development of scenarios to support the Total Maximum Daily Load, the Watershed Implementation Plans, Progress runs, Milestones, and other requests. The CBP Partnership currently undertakes 100-200 Scenario Builder and Watershed Model runs per year and a lesser number of land use change model and estuarine model scenarios.

Operational Development: the programming and development work that supports the ability of the CBPO to efficiently run scenarios and to quickly respond to decisions made by the partnership.
Research-Oriented Development: the development of new models or modification of old models to add new processes. This type of model development consists of conceptual modeling, code development, testing, and model validation.
Research: the application of models and analysis of model output to answer questions that the current CBPO suite of models is not ideally equipped to answer.

To provide the greatest management effectiveness, the four functions of CBP modeling must be tightly linked to each other for management. The closest linkages are needed between neighboring functions. However, the governance structure must provide an overarching framework to coordinate efforts among all the functions.

MLAT Recommended Actions to Create a Chesapeake Bay Modeling Laboratory:

Recommendation #1: A Chesapeake Bay Modeling Laboratory should be established to take on research, research-oriented development, and some operational development of Chesapeake Bay Program models. A modeling laboratory is a critical component in addressing the significant issues brought up by the NRC/NAS report and STAC recommendations. Resources at a modeling laboratory would help close an existing gap in research and model development at the Chesapeake Bay Program and improve integration of knowledge, expertise, and development skills of the academic community into the modeling program,
Recommendation #2: The state representatives on MLAT strongly recommended that the Modeling Laboratory should also assemble and calibrate the operational models. Under this recommendation, the existing Modeling Team at the CBPO office would be incorporated into the Modeling Laboratory.
Recommendation #3: A Modeling Laboratory Board of Directors appointed by the Management Board should be created from a re-constituted Modeling Workgroup. The appointees must have both the technical expertise and the authority to make the technical decisions related to modeling at the CBP. The Board would prioritize input from the Goal Implementation Teams (GITs) and the Workgroups and work interactively with the CBML to determine the scope of each annual work plan

Funding a Chesapeake Bay Modeling Laboratory:

Expanded, sustained funding is needed to ensure the essential modeling functions. Without sustained funding, new and emerging issues requiring substantial model revision will not be incorporated, thereby jeopardizing the model as a credible tool for simulating local/regional water quality and projecting future scenarios through an increasing population, changing land use, and climate change. The CBML will require approximately $1.5M annually to meet research objectives that have been identified for improving the CBP modeling system, and $0.5M annually for enhancing the operational component. This would be new funding above the funding that the CBP and its partners currently use to support the Modeling Team. Offered through a Request for Services (RFS) or Request for Proposals (RFP), the funds would support a permanent/core staff and modeling expertise for management-specific modeling needs.