COAST: Chesapeake Online Assessment Support Tool

A web-based analysis tool for improved management of the Bay ecosystem

COAST- What is it?

COAST is a web-based tool that allows managers to employ an adaptive-management approach for coordinating, implementing, and assessing management actions. COAST will help support implementation of the Chesapeake Action Plan, which will enhance coordination and integration of Chesapeake Bay Program partner activities to restore the Chesapeake Bay and its watershed and better assess the success of the activities. The initial version of COAST will focus on water-quality activities in the watershed and have several components:

1. Map the range of nutrient loads to better focus management actions.
2. Test alternative scenarios to implement management actions.
3. Assess water-quality change and progress.
4. Better understand the factors affecting water quality.

These components will help users address management questions such as:

- What is the range of nutrient yields contributed by different watershed areas to tributary streams and to the Chesapeake Bay?
- Where are the areas in the Bay watershed where management actions have the greatest potential to improve the Bay ecosystem?
- What are the sources of nutrients in different areas?
- What is the estimated reduction of nutrient loads under different management scenarios?
- How has water quality changed in the watershed?
- What is the progress toward meeting water quality and restoration goals?
- What are the factors affecting water-quality change and their implications?

The data used to answer these questions is already publically available but not necessarily easy to access or integrate. COAST allows for improved access and integration of these data on a variety of spatial scales so federal, state, and local governments and entities can better coordinate, choose, and assess management actions. In the future, COAST will evolve to better support the Chesapeake Action Plan and potentially expand to include information related to living resources, habitats, land use, other aspects of water quality (such as estuary quality contaminants), and economic analysis.

Who are the Users of COAST?

The initial version of COAST will be used most frequently by the CBP partners (federal, state, local governments and non-governmental organizations NGO's) who implement water-quality management actions to meet the goals of CBP tributary strategies and also improve local water quality. As the tool evolves to support the Chesapeake Action Plan, there will be a larger and more varied group of users.

What are the Major Components of Version 1.0 of COAST?

(1) Map the range of nutrient yields.

The data used for mapping the range of nutrient loads (and eventually sediment loading) for different "source sectors" will be based on SPaRROW (SPAtially Referenced Regressions On Watershed attributes) model results. The source sectors for water quality in the Chesapeake Action Plan include: developed lands, agricultural lands, point-source discharges, atmospheric deposition, forests, and rivers and stream erosion (sediment only).

(2) Test Alternative scenarios
The scenario builder allows the user to test alternative management scenarios based on the Chesapeake Bay Watershed Model Phase V and the new user interface known as "Vortex". The "Vortex" allows users to develop different management scenarios and estimate the resulting nutrient and/or sediment reductions. The Vortex will be capable of rapid scenario development, graphing and tabular reporting of scenario output and linear interpolation and best fit regression line projections/interpolations of land uses, best management practices, animal source populations, and nutrient/sediment sources. In the future, links to other models (such as state and local government efforts) will be part of this component.

(3) Assess water-quality change and progress in meeting goals.
This component will provide access to results from the annual trend analysis of the Chesapeake Nontidal Water-quality network and the CBP annual health and restoration assessment.

(4) Understand the factors affecting water quality
This component will provide access to information to help understand the factors affecting water quality in the watershed and thereby help decision makers adopt more effective management actions in the future. These factors include land-use and population change, changes in nutrient and sediment sources, implementation of management actions, and information about lag time between management actions and ecosystem response. In the short tem, results from the USGS-CBP report on factors affecting trends will be used for this component of COAST. Longer-term information from addition sources, such as the Chesapeake Bay Watershed model, the Chesapeake Bay Program land-change model, and other information will be included.

How is COAST being Tested?
The COAST team is conducting an early test case for COAST, during the development phase, to put the concept of adaptive management into practice. This test case moves the theory of adaptive management into a real-world application by using real data and real users to inform current decision-making in the agricultural sector.

The COAST team started with an agricultural test case because of the NRCS's interest in using COAST to look for opportunities to direct its existing Farm Bill resources to Chesapeake Bay priorities. The objectives of the agricultural test case are:

(1) to demonstrate at a watershed-wide and state scale how COAST can be used to prioritize <u>where</u> to direct resources for agricultural nutrient conservation activities.
(2) to demonstrate to counties how COAST can be used as a springboard from which to engage in a more locally driven analysis to identify opportunities for achieving further nutrient reductions from priority agricultural areas.

This test case explores several components of the COAST tool associated with water quality and nutrients at a regional, state, and county scale. This test case does not focus on testing the web-based application of the tool, but rather focuses on the logic used, the questions asked, and the data layers employed to guide managers in their decision making. The questions the COAST team is exploring during this test case are:

- What are the right questions to ask?
- What are the most useful data to use in answering those questions?

- How important is more local data and how should it be factored into COAST?
- How should we structure the web interface of COAST to maximize utility of the tool to multiple users for multiple purposes?

The focus of the test case is on identifying WHERE agricultural conservation actions should take place for the greatest Bay benefits. Once managers have determined where to focus actions, the next step is to determine WHAT actions to take. The COAST Team developed a "decision support tool" to guide managers through a thought process on determine what actions modeled after the industrial pollution prevention hierarchy were pollution prevention is encouraged over in-field mitigation and edge-of-field treatment. The use of this decision support tool will be tested in the near future (as soon as the late summer for the county level test case) as the test cases advance to that stage.

The COAST Team will take the lessons learned from the agricultural test case and build them into the web-based COAST tool for Version 1.0. The COAST Team is already setting up a similar test case for developed lands to be conducted in the winter. Version 1.0 of COAST will be updated based on these subsequent test cases.

What is the COAST FY2008 Schedule?
October-December: Initial ideas for COAST.
December-March: Begin draft development of each component and agricultural test case.
April-June: Presentations to different user groups and continue development of each component.
June-September: Use results from the test case to refine components of COAST.
September: Release of Version 1.0

What are the Longer Term Tasks For COAST?

- Conduct additional testing with other user groups and refine applications for water quality components (FY2009). These enhancements include:
- Provide a links to state and local community developed decision support tools (FY2009)
- Develop a "cost effective" application based on current USGS EGSC research to complement mapping loads tool and Scenario Builder components of COAST.
- Integrate a Chesapeake Bay tailored version of the National SPARROW Scenario Builder
- Update COAST information based on more recent SPARROW results (2002 models).
- Further develop scenario builder (Vortex) of COAST through GIS enhancements, data management enhancements, report design and export, web site and code optimization, and Chesapeake Bay Program partner support.
- Plan, decide, and implement enhancements to COAST to support other aspects (living resources, habitat, land use) of the Chesapeake Action Plan (FY2009-2011).

Who are the COAST Contacts?
The COAST is being developed and implemented through a partnership between the U.S. Geological Survey and the Chesapeake Bay Program (CBP) Office. For further information, contact: Scott Phillips, USGS, (swphilli@usgs.gov) or Kelly Shenk, EPA CBPO (shenk.kelly@epa.gov).

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