

COSEE-MA Ecosystem Health Teaching Tools Now Available

The Mid-Atlantic Center for Ocean Science Education Excellence (COSEE-MA) would like to announce three items available from our center as tools for teaching and curricula development: the [Eutrophication Kit](#), the [Oil Spill Activity](#), and the [Invasive Species Game](#). These materials were first made available in professional development courses for middle school educators across the Mid-Atlantic. Each item was professionally evaluated by the teachers who attended the course and tested in their classrooms throughout the following school year.

The Eutrophication Kit will give students a hands-on perspective on nutrient enrichment in a water body and how this can potentially lead to a eutrophic environment. The Kit comes with water quality testing tools for various chemical parameters that are commonly-used indicators for eutrophication. Parameters that can be measured with the Kit include concentrations of nutrients as well as dissolved oxygen. Along with these tools, a hands on, inquiry-based lesson is included for teachers and students to create eutrophic tanks and observe their development in the classroom. The lesson includes a step-by-step procedure for introducing the concept of eutrophication in the classroom and for introducing the various tools that the students will be using for the activities. Links to useful web sites with monitoring information for the various nutrients that the Kit analyzes are also offered in the lesson to relate observations in the class to observations in the real world.

The oil spill activity utilizes a model developed by the National Oceanic and Atmospheric Administration to predict where oil spills might go (i.e., GNOME.) GNOME is available for free from the NOAA web site. However, COSEE-MA have developed instructions to get teachers and students up and running with the program as well as several activities. In the oil spill activities, students can actually observe a modeled spill on their computer near coastal zones such as Delaware Bay and the Chesapeake Bay and watch the oil move with currents and wind. Examples developed by COSEE-MA allow students to dynamically input currents and winds to observe the oil's movement and how it changes with different data.

The Invasive Species Game places students in the roles of port managers interested in building their ports and increasing their economic advantage through ship traffic. However, ships coming into harbors also may contain non-indigenous organisms in their ballast water that could potentially disrupt the ecology of their ports as well as the economy. Students compare the habitat of their ports including water quality to the habitat requirements of the species in ballast water to determine if they may be able to settle. To prevent invasions from non-indigenous species, students may hire environmental scientists that can detect species and keep them out. The game comes fully boxed with pieces, game mat, rules, and a CD containing forms as well as a tutorial to get players up and running. Rule books include hand-illustrated portraits of the

various invasive species featured in the game along with biological fact sheets and a historical perspective on the habitat disruption they have caused in various coastal zones around the planet. Ports that students operate are modeled after commonly found coastal regions including fjords, active coastal margins, and passive coastal margins.

Curricula standards (from National Science Education Standards) emphasized in the activities include:

- abilities necessary to do science inquiry;
- understanding about scientific inquiry;
- properties and changes of properties in matter, motions and forces, structure and function in living systems;
- reproduction and heredity;
- regulation and behavior;
- population and ecosystems;
- diversity and adaptations of organisms;
- earth's history;
- abilities of technological design;
- understandings about science and technology;
- populations, resources, and environments;
- risks and benefits;
- science and technology in society; and
- science as a human endeavor.

Positive comments from teachers in the 2004 and 2005 course included:

“The Game Rocks!”

“I thought the invasive species game was very useful.”

“The Oil spills site ... will fit right into discussions on advantages and limitations of models.”

“GNOME will be very cool for my kids!!!”

“Most useful: the oil spill simulation- it shows currents as well as local winds.”

“The Game was great. It will definitely keep students engaged.”

“The Game was amazing!”

“Loved the game...going to do a lesson around it.”

“The NOAA GNOME program and [Invasive Species] game... are excellent teaching tools as well as models for review and/or investigation.”

“Most useful: Invasive species game. Very usable. Will get kids excited & interested.”

“I thought the activity on oil spills was very useful. That could be implemented in my classroom right away.”

“The eutrophication lab is wonderful and will be used the first quarter. The games are nice options for small groups in the classroom.”

“The [eutrophication] activity will [definitely] be something that I will be able to modify for my students. Anything that is hands-on is something that can relate real-life science to my students.”

“The oil spill simulation is excellent for my use in a technology lab. I am required and will be evaluated specifically on increasing the number and types of technology applications in my classes. This simulation meets my instructional needs and my students entertainment issues.”

“[The most useful lesson was the] eutrophication activity; provides hands-on science for students.”

“The [eutrophication] test kit ... is just wonderful! I have been hoping for something like this that will perfectly meet my needs!”

“I want to try the GNOME computer activity with my students. I think it will be interesting and fun for them as well as educational.”