

Introductory Performances

1. *Definitions.* We will introduce the definitions of runoff and watershed by working as a class to construct a model of a watershed in a large plastic container as described at <http://www.epa.gov/region1/students/pdfs/wetaccp1.pdf>. Students will record their own observations of what happens to the water sprayed on the model under different circumstances during the experiment. After helping to create the model and experimenting with what happens to water sprayed on the model, we will work as a class to create a working definition of a watershed. In a large group, students will have an opportunity to share their recorded observations from the experiment and to brainstorm about their own experiences with runoff (Does anyone have a basement that floods? Does anyone live near a stream? Has anyone noticed the hay protecting the edges of steep hills on our school's campus?). Once we have created a list of observations about how water moves, the teacher will present one definition of a watershed, and ask students to think about how our model acted as a watershed. In this first performance, no software will be used (since the experiment involves spraying water, this would best be done outside, without the laptop cart).

Students will be observed during the experiment and class discussion, using observation sheets. The teacher will note participation and understanding of the watershed concept, and follow up individually with students who need further explanations.

2. *Mapping.* After an explanation of the definition of a watershed and a review of how a topographical map works, students will work individually to determine the boundaries of our watershed. By drawing lines parallel to the contours on the map, students will be able to determine where water runoff will end up, and outline the edges of our watershed. In small groups, students will compare results with each other as well as with standard definitions of the boundaries of our watershed, and share their observations. Within these groups, students will be given assigned roles – moderator, secretary, presenter – to facilitate the discussion. Still in these groups, students will participate in online research as we check to see how others determine the boundaries of the Neponset River watershed. Students will explore a pre-selected list of websites (made available on an internal web page) in looking for this information.

The presenter in each group will explain the group's map to the class in an oral presentation of a few minutes. All members of the group will help answer questions about how they arrived at their map.

3. *Literature.* As a class, we will read several short books over a period of days. Books read will be: *The Lorax* (Dr. Seuss), *A River Ran Wild* (Lynn Cherry), and *How the Forest Grew* (William Jaspersohn and Chuck Eckart). We will discuss the issues that arise as we read, and students will use *Inspirations* to keep a map of ideas they come across as they begin to think about environmental issues. By fifth grade, our students have experience using this software, but we will start with a quick review of ways to enter information (outline mode, rapid fire mode). During individual conferencing, students who need more review on software use will be able to get help.

Inspiration maps will be assessed by the teacher. Students will have conferences with the teacher to go over their maps and talk about their ideas for an issue topic.

Guided Performances

1. *Site visits.* We will visit two sites within our watershed – one a nearby state park with a stream, and the second a nearby community parking lot that drains into a marsh and stream. Students will document the environmental conditions of the site with a digital camera, collect water samples (which we will test for pollutants using an EPA water test kit back in the classroom), and tally (without touching, for safety reasons) trash found on the site. We will also measure the parking lot and calculate the amount of runoff created by it.

After returning to the classroom, we will combine our trash tallies into a classroom set of data (students who choose to can use this information as a part of their final PowerPoint presentations). While giving students a chance to discuss their findings, the teacher will present the idea of impermeable surfaces and how they affect runoff.

Students will write a reflection piece on their experience, comparing and contrasting the two sites which will be turned in for assessment by the teacher.

2. *Mapping (part two).* Using *GrassGIS* and data sets for the region pre-collected by the teacher, students will create a watershed map on the computer. From the datasets, students will show impermeable surfaces (like the parking lot) and protected areas (like the park) on their maps.

In a lab setting, we will open the land use and roads data file for the watershed (data will have been pre-clipped to the area of study by the teacher, and pre-installed on lab computers, so that students do not need to handle data file management). In an exercise guided by the teacher (using a projector to demonstrate), we will use the road data to orient ourselves and pick out locations we recognize on the map – our school, student's homes, our study sites. In this guided exercise, students will also learn to turn display of data sets and legends on and off, and to assign colors to data by type (using the land use data set, we will assign colors to residences, industries, and open space).

After the guided exercise, students will add at least one additional data source (from the pre-installed data) to their map, using color and a legend.

Students will be given a checklist for this assignment, and work will be assessed accordingly. The checklist will include the details of the material that must be included on the map – watershed boundaries, a set of data affecting pollution (pollution sites, zoning, etc.), and a legend. Students will peer review each other's work with the checklist before submitting to the teacher.

3. *Social concerns.* Using their *Inspirations* idea maps and the concerns they have generated as we visited local sites, students will use the library and the Internet to research an environmental issue of their choice. Students will be encouraged to choose an issue of relevance to our local watershed and to use recent local news articles as one of their research sources. Using this research, students will write a statement of their issue and a brief proposal for how they might help to resolve the issue.

As in the mapping performance, we will work in the computer lab, and begin with by searching for information on our specific watershed as a group. Students will suggest search terms, and the teacher will point out why some searches worked well, and how search terms could be changed to yield more specific results. The teacher will also model evaluating any resources found in this search. Both our libraries resources and Internet resources will be searched.

After our model search, students will have an opportunity to try out their own topics. Using the library staff as a resource, adults (the teacher and librarians) will meet with students individually to help with searches. Once students have a list of sources, they will meet with a research buddy and explain which sources they are using, and which they feel are unreliable.

Students will write a persuasive essay on their social issue, using the research resources found in this performance. The essay will present the issue, present the writer's side of the issue, and present an action plan for addressing the issue.

Culminating Performance

See separate assignment and rubric file.