

Arthur Carhart National Wilderness Training Center's
Wilderness Investigations
High School

Wilderness Applications/Lesson 4
Water Quality, Watersheds and Wilderness
(2 of 3 Wilderness and Water lessons)

Goal: Students will understand how water moves within a watershed and how the quality and quantity of water within a watershed can be negatively and positively affected.

NOTE: Your students may not need this lesson if they have already focused on these topics. If that is the case, skip ahead to the next lesson (Lesson 5).

Investigation Objectives

Audience: 9-12 grades.

- Students will understand how water moves within a watershed. (Behavior)
- Students will be given instructions and supplies to make a topographic map of a model of a watershed (see lesson 6 for the model of a watershed instructions/lesson). (Condition)
- Students will identify the points of origin, pathways, and pools on their topographic map. (Degree)

Common Core Standard Connections

NOTE: See Common Core Standards sections to see listed objectives for this and other lessons/activities.

Time Requirement: 50 minutes

Location: Classroom

Materials/Resources Needed and Pre-Investigation Tasks

- 8 x 11 paper
- Markers, colored pencils, paint, etc.
- Model watershed (from lesson #6)
- Permanent marker

Teacher Background

This lesson is best suited as a follow up lesson to lesson # 6 "Model of a Watershed". Be familiar with how to read a topographic map and how to

create a basic topographic map. For example, in the delivery of instruction the teacher may pull up a topographic map from the internet on the overhead projector and point out:

- The map key states how many feet are between each contour line on the map and the distance that each square on the map represents.
- Lines that are closer together mean steep terrain.
- Lines that are farther apart mean less steep terrain.
- Circles mean the highest point in an area, usually mountains or hills.
- The blue lines that represent rivers—always move down slope, and are an easy way to determine whether a slope is losing or gaining elevation.

Another way to teach how to read and create a topographic map is to have students use their hands. They can do this by making a fist and imagining that the knuckle on their index finger is the highest point or peak of a mountain. They could trace an imaginary line with their other index finger around the top of their knuckle. Then they could draw three more imaginary concentric circles around their knuckle, moving from the highest point down. They should be instructed to notice how the circles they are drawing gain and lose “elevation” as they circle their knuckle. The repetitions of concentric circles that dip between their knuckles create a “river”. This exercise could be helpful in explaining how lines on a topographic map behave, what they represent, and how they are interpreted.

Step-by-Step Presentation Instructions

Activity # 1: Topographic map of watershed model.

- The teacher will instruct students on how to read and create a topographic map.
- Students will get their watershed model (this time, keep the model dry, there is no need to use the spray bottles).
- Students will then use the permanent marker to draw concentric circles (contour lines) from the highest point of their model to the lowest.
- Once the model has had contour lines drawn on it, students will then use paper and markers/colored pencils to create a topographic map of their watershed model.

Assessment:

- Students will then label their hand drawn topographic map of their model watershed with: points of origin, drains or “rivers”, and basins or “lakes”.
- Students will then think, pair, and share: a t-chart that illustrates the ways in which the water quality within a watershed could be negatively and positively affected.

Example:

H2O Quality: Positively affected	H2O Quality: Negatively affected
-garbage clean up -install fish screens on irrigation canals -controlled river access for herds on range land -planting trees/shrubs on banks to prevent erosion -do not dump chemicals, house hold cleaners, etc. in areas such as streets/parking lots where they will run off into the sewer drain and eventually flow into rivers	-unsustainable logging practices -cutting down trees/shrubs near rivers, which removes shade and raises river temperatures -illegally dumping chemicals into sewers -dumping untreated waste water -over fishing -industrial, agricultural, and urban runoff. -removing too much water from rivers for human use

Journal Prompt:

Think about the bodies of water near where you live or have traveled—do you have any stories to share about a body of water that you have visited several times throughout your life? Or, a body of water that you would like to one day visit? Please share why this body of water is special to you and what you like or would like to do there.

Extension Ideas:

- Teachers could have prefabricated cut outs representing: mining, housing developments, agriculture demands (irrigation/run-off), etc as well as prefabricated cut outs representing: restoration efforts: planting tress/shrubs in riparian areas to prevent erosion. The teacher could place one or more of these symbols on the student’s model watershed and students could be asked what changes this could bring to the watershed.

