Watersheds Lesson Plan

Keywords: watershed, water cycle, transpiration, groundwater

Lesson Plan Grade Level: 6^{th}- 8^{th}

Total Time Required For Lesson: 50 minutes (as one continuous time block)

Setting: Classroom

Subjects Covered: Science

Topics: watersheds, water cycle

Goals For The Lesson:
Students will be capable of describing a watershed.
Students will understand the water cycle.
Students will gain an understanding of how humans can affect and protect watersheds.

Materials Needed:
Watershed fliers (From the Woods Series)
Watershed posttest (one for each student)
Watershed pretests (one for each student)
Washable makers (one for each pair of students)
Water droppers (one for each pair)
Drawing paper (one for each student)
Small containers to hold water (one for each pair)
Pencils (one for each student)
Crayons (several colors for each group)
Appendices 1,2, & 3
Topographic map (as an example, see reference section)

State Standards Addressed: *E&E Standards:* 4.1.7
S&T Standards: 3.5.7

Teaching Model: Experiential Learning Model (Experience, Share, Process, Generalize, Apply)

Methods:
Preparation:
Read through the entire lesson to ensure your understanding of the material and activities. Be sure to have all the copies and materials before beginning the lesson. Complete the activities prior to teaching the lesson so the students may refer to an example.

Doing The Activity:
Introduction to the lesson:
"Today will be learning about Watersheds. Our ultimate goal is understand the concept of a watershed."

Steps:

(Experience and Share Stages 30 minutes)

1. Administer the pretest to the students; explain that the purpose of the pretest is to test knowledge the students already have acquired on the subject. (allow approximately 5 minutes for the test then collect)
2. Ask the students if they would like to make any comments concerning the pretest.
3. Give each student a copy of the 'Watershed' flier, read orally together, discussing key points.
    - While reading the section entitled 'THE WATER CYLE' refer to the illustrated diagram (ensure that the students refer to the diagram after reading about the key terms, pointing out precipitation, transpiration, evaporates, stream runoff, and ground water).
    - While reading the section entitled 'WATER MOVES WITHIN THE WATERSHED' refer to and discuss the photos titled 'Water movement through a watershed'
    - Go over all the remaining illustrations as you read or when you have completed.
4. Complete discussion questions – Appendix 1. Then ask the students if they have any questions concerning the material.
5. Explain to the class that they will be completing an activity which will demonstrate the flow of water through a watershed. They will be working in pairs (selected by the instructor or the students). Ensure each pair receives all proper materials (water dropper, small container with water, marker, crayons and paper). Go over the instructions with the class as a group. You will be completing three activities with the class, work together, completing and discussing each activity before moving on to the next activity. (See Appendix 2).

(this activity was adapted from the web site *http://slaggarden.cfa.cmu.edu/education/modules/aaas.html)*

(Share and Process Stages 8 minutes)

7. Ask students to write a brief description (3-4 sentences) of their observations on their hand drawing.
8. Ask students to identify the boundaries on their hand drawings.
9. Ask each pair to share their discovery. Review what had been learned through the lesson. (You may ask questions from Appendix 1, again.)

(Generalize and Apply Stages 12 minutes)

10. After the educator has reviewed all the information concerning the flier and activities (prepare the students for the posttest), again ask the students if there are any questions. Ask the students to discuss what they had learned today.
11. Administer the post test. Allow the students time to complete then collect.

Assessment: The students will be evaluated through participation during the reading and discussions. The students will be evaluated upon completion of the activities and the post test.

Conclusion To The Lesson: "This completes today's lesson. Does anyone have any further comments concerning the lesson? I hope that you have gained a more thorough understanding of watersheds. Let's try and do our part to help protect watersheds."

References and Resources: *Watershed* Flier (From The Woods Series)
The Pennsylvania State University
112 Agricultural Administration Building
University Park, PA 16802

The Pittsburgh Children's Museum
10 Children's Way
Pittsburgh, PA 15212
http://slaggarden.cfa.cmu.edu/education/modules/aaas.html

Inventory of World Topograghic Maps. Elsevier Science, 1989.
http://www.dcnr.state.pa.us/topogeo/topomap.htm

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Appendix 1- Watersheds
Discussion Questions

1. Who can describe a watershed?
   The land area through which any water moves or drains to reach a stream or other body of water; range in size; shape determined by surrounding terrain, etc.

2. What do we commonly call two forms of precipitation? *snow and rain*

3. What is the precipitation that flows quickly over the ground and into a stream called? *Surface water or surface runoff*

4. Who can explain what a spring is? *Groundwater that comes to the surface*

5. How do people affect watersheds? *Acid rain (ensure the students explain that it comes from air pollution), land development (parking lots, buildings etc.), pollution through chemicals and wastes etc.*

6. How can watersheds be protected? *Buffer strips (ensure the students explain that a buffer strip is a strip of trees or other vegetation that has remained natural (grows naturally) or is maintained by humans), careful use of harmful chemicals and fertilizers.*

7. Ask the students to refer back to the water cycle diagram and point out the following terms:
   Precipitation, transpiration, evaporation, stream runoff, groundwater, and stream flow.

Ask the students to explain what they think may happen if part of the cycle went dry. (*any appropriate response is acceptable)*

Appendix 2-Teacher's Instructions- Watersheds

Draw your own topographic map

- Ask the students if they have ever seen a topographic map/ ask them what may be seen on these maps.
- Show an example of a topographic map. Explain that each line represents an elevation level. Have the students look at the elevation lines
- Ask the students what could naturally affect watersheds boundaries. (low/ high elevations, mountains, etc.)
- Explain to the students that they will be drawing their own topographic map. They will trace their hand and then draw elevation lines ¼" in from the outline of their hand. (see Appendix 2a for an illustration)
- Pass out all materials and allow time for the students to trace their hands and draw the lines.

STOP

Where does all that water go?

- Ask the students to look at their hands. Ask the students which way they think water will go when it 'rains' on their hands?
- Tell the students to place three dots on their hand. Then they should place the dots on their drawing. You may want to provide the students with an example by placing the dots on the example.
- Ask the students to draw arrows to demonstrate which way they think the water will flow on their drawing.

STOP

How water moves within a watershed

- Ask the students to again look at their hand; noticing the bone structure, low points and high points.
- Explain to the students that they will be using a water dropper to place water on their hand; on each of the dots they had labeled.
- After they have observed the water drops ask the students to track the motion on their drawn hand. If there is time permit the students to experiment on other areas of their hands. Remind them to document all observations on their drawing.
- Lastly, have the students outline a single "watershed" on their hand drawing. Hint: all the water from a watershed should flow into the same "body" of water, in this case perhaps a "long lake" between two fingers.

STOP

Appendix 2A