Texas Watch

Lesson Plans for 8th to 12th Grade Students

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Introduction to Water Monitoring
Water Quality Sampling

Time Frame: One 45-50 minute class
Grade Level: 8th – 12th Grade

Preamble

Since Texas Watch's start in 1991, "students" of the environment have come to Texas Watch in search of answers. Citizens have asked us, "How safe is my water?" Environmental decision makers have asked, "How can Texas Watch provide more data for water quality assessment?" And Science teachers have come to Texas Watch in search of real-world activities to enhance their presentation of scientific concepts and information.

The water quality monitoring curriculum presented here is designed for High School and Middle School science teachers. For use as a companion to the Texas Watch Water Quality Monitoring Manual, this curriculum covers the key environmental and scientific concepts associated with Texas Watch's core water quality variables. In addition to presenting the procedures for preforming the water quality tests, this curriculum provides lessons, exercises, evaluation materials and TEKS correlations. Texas Watch hopes this curriculum will facilitate the presentation of Texas Watch concepts in the classroom and field.

Overview: What Is Texas Watch

Recognizing the size and complexity of the water environment, the time and expense of monitoring water quality, and the significant role each one of us has in protecting Texas' waters, the Texas Commission on Environmental Quality (TCEQ) has developed Texas Watch. Texas Watch is a program of environmental monitoring which is implemented through a cooperative partnership with Southwest Texas State University (SWT). Texas Watch emphasizes communication about the environment, which is based on the premises that water issues are inextricably linked with air, biological, land, and human resource issues, and that the protection of the environment requires the active, positive, cooperative participation of all Texans. Texas Watch involves the participation of volunteers, students and teachers at all academic levels, the TCEQ and Texas Watch Partners such as river authorities, regional councils, businesses, universities and other agencies.

Texas Watch encourages everyone to ask:

- What questions do we want to answer about the environment?
- What parts of the environment are we most concerned with?
- What can I do to help preserve and protect the environment?

Texas Watch, then, helps volunteers design environmental monitoring programs to address those questions.

Academic Question:

What are the water qualities that determine if water is good for human consumption and as habitat for aquatic organisms?

Objectives:

- To understand variables that effect water quality.
- To differentiate water qualities that affect human safety and homes for aquatic organisms.

Process/Activities:

1. Gather materials: 6 numbered cups per group, food coloring, rubbing alcohol, leaf litter, bottled water, club soda

2. Prepare the cups of water.
    a. Cup 1: tap water
    b. Cup 2: bottled water
    c. Cup 3: bottled water with food coloring
    d. Cup 4: bottled water with leaf litter
    e. Cup 5: tap water with rubbing alcohol
    f. Cup 6: carbonated water.

3. Ask students to evaluate the water quality of each cup WITHOUT DRINKING THE WATER. Remind the students that early chemists tended to die young because they would taste unknown compounds. Students do not know what is in the water, so must only use their powers of observations and smell.

4. Have the groups evaluate the cups of water.

5. Each group will present a list of cups with good water quality to the class.

6. Tell the students what each cup contains, and how it might impact water quality for human consumption and as habitat for aquatic organisms.

NOTES:

Cup 1: is tap water containing chlorine. This chemical makes the water safe for drinking, but burns the gills of aquatic animals, and eliminates the bacteria and protists that are the base of the aquatic food chain.

Cup 2: is bottled water. This water lacks chlorine, and is safe as habitat and for drinking.

Cup 3: is colored bottled water. The coloring does not affect its safety for drinking, however, it will affect the water as habitat. When water becomes less transparent, or loses clarity, the ability of plants to photosynthesize or predators to find prey is impacted.

Cup 4: is bottled water with leaf litter. The introduced impurities make the water unsafe to drink but the leaf litter, in small quantities, does not negatively impact water for habitat.

Cups 5: is tap water with rubbing alcohol. The water appears clear and clean, but is actually toxic to humans and to habitat for aquatic organisms.

Cup 6: is carbonated water. This soda water is fine for drinking, but the additional gases change the pH values to make it unfit as habitat for some species.

Resources:
Texas Watch Monitoring Manual