HU GK-12 Activity

TITLE: Measuring Water Quality With Organism Sampling

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DCPS STANDARDS: E.8.2, E.8.5

GOALS:

1. Scholars will be able to describe sources of water pollution.
2. Scholars will be able to discuss the impact of water quality on human health, wildlife, and vegetation.
3. Scholars will be able to identify environmental stressors and explain how each stresses the environment.

OBJECTIVES:

1. On a data sheet, scholars will record the organisms they identify at different positions along an artificial stream. Scholars will determine whether the area of the stream is heavily, moderately, or lightly polluted based on their findings.

PREREQUISITE KNOWLEDGE:

Background

The quality of water is perhaps the most important issue in environmental science today. Freshwater makes up such a small proportion of the water on Earth it is imperative to keep it clean. Every organism on Earth requires water to survive. Water quality is the chemical, physical, and biological characteristics of water in relationship to a set of standards used to monitor organism health. Water quality standards are created for different types of water bodies and locations. The main reason for creating water quality parameters relate to having safe and healthy drinking water. The health of ecosystems is also important, as many of the organism's humans greatly rely upon for food and other resources need clean water for growth and development.

Environmental water quality includes the measure of the health of lakes, rivers, and oceans. In the case of environmental water quality, the standards vary significantly due to different ecosystems and environmental conditions. Environmental water quality may be affected by industries and housing developments. Even digging underground can change the quality of water. There is a great deal of desire to return water bodies to pristine or pre-industrial conditions. This challenge can only be accomplished by studying aquatic ecosystems and minimizing pollution.

ESSENTIAL QUESTIONS:

1. What types of factors cause water pollution?
2. Why are certain organisms more resistant to pollution than others?
3. In what ways can water pollution be managed in the District of Columbia?

LABORATORY MATERIALS:
Invertebrate taxonomic key, photographs of invertebrates, rubber tubing ~ 20 feet long, water, taxonomic key *(prepared by teacher), permanent markers, photographs of various industries, businesses, and housing complexes.

DIFFERENTIATING INSTRUCTION:
The English language limited scholar is no longer in this class. All lessons will be presented in English. Learning accelerated scholars will be given the opportunity to observe take actual samples from the creek near Cesar Chavez Public Charter School after school. Learning disabled scholars should have no difficulty completing this activity.

RATIONALE:
This activity is designed to demonstrate how sampling aquatic organisms can be used as a bioindicator to measure water quality.

RESEARCH ACTIVITY:
Experimental set-up:

1. Arrange the classroom desks into four per section on one half of the room.
2. Place a half open tube (this will act as an artificial stream or river) in an oxbow-like pattern in the front half of the classroom.
3. Fill the tube with clean tap water about halfway to the top.
4. Label the tube from mile zero to mile seven.
5. Place laminated photographs in the water at each mile and secure with a clip to keep the photographs stationary.
6. Place organisms normally found in pristine water at or near mile zero.
7. Place organisms normally found in heavily polluted water at or near mile seven. The water quality status should gradually change between mile zero and mile seven.

Laboratory activity:

1. Pair scholars in groups of two.
2. Each pair of scholars will be given a net to extract water samples containing aquatic organisms.
3. Line scholars up to visit each point along the seven mile stretch of water.
4. Scholars should write down on their data sheet the aquatic organisms they observed at each point along the river.
5. Scholars should label the water at each mile as highly, moderately, or lightly polluted.

EVALUATION AND ASSESMENT:

1. Given a list of the businesses and industries near each mile on the artificial river, Scholars will draw conclusions in paragraph form about the possible source of pollution apparent in the river.
2. Scholars will identify the organisms found at each mile along the river by using a taxonomic key.