

Reading the River, Summer 2004

Water Quality Assessment Unit

8th Grade Science

Brandy Morris

Morgan County Middle School

July 30, 2004

Water Quality Assessment Unit

Academic Expectations:

2.1 Students understand scientific ways of thinking and working and use those methods to solve real-life problems.

2.2 Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.

2.3 Students identify and analyze systems and the ways their components work together or affect each other.

Program of Studies:

S-8-SI-2 Students will use appropriate equipment (e.g., barometers), tools (e.g., meter sticks), techniques (e.g., computer skills), technology (e.g., computers), and mathematics in scientific investigations.

S-8-SI-3 Students will use evidence (e.g., computer models), logic, and scientific knowledge to develop scientific explanations.

S-8-SI-6 Students will review and analyze scientific investigations and explanations of other students.

S-8-PS-1 Students will analyze properties (e.g., boiling point, solubility) and changes of properties in matter.

S-8-LS-4 Students will investigate and analyze populations and ecosystems.

S-8-AC-2 Students will examine the interaction between science and technology.

S-8-AC-3 Students will recognize how science is used to understand changes in populations, issues related to resources, and changes in environments.

Core Content for Assessment:

SC-H-1.2.4 The physical properties of compounds reflect the nature of the interactions among molecules. These interactions are determined by the structure of the molecule including the constituent atoms.

SC-H-2.2.2 Movement of matter between reservoirs is driven by Earth's internal and external sources of energy. These movements are often accompanied by a change in physical and chemical properties of the matter. Carbon, for example, occurs in carbonate rocks such as limestone, in the atmosphere as carbon dioxide gas, in water as dissolved carbon dioxide, and in all organisms as complex molecules that control the chemistry of life.

SC-H-3.4.3 Biological classifications are based on how organisms are related. Organisms are classified into a hierarchy of groups and subgroups based on similarities that reflect their relationships. Species is the most fundamental unit of classification. The comparison and analysis of their internal and external structures and the similarity of their chemical processes classify different species.

SC-H-3.5.1 Atoms (e.g., carbon, nitrogen) and molecules (e.g., water) cycle among the living and nonliving components of the biosphere.

SC-H-3.5.3 Organisms both cooperate and compete in ecosystems. Often changes in one component of an ecosystem will have effects on the entire system that are difficult to predict. The interrelationships and interdependencies of these organisms may generate ecosystems that are stable for hundred or thousands of years.

SC-H-3.5.5 Human beings live within the world's ecosystems. Human activities can deliberately or inherently alter the dynamics in ecosystems. These activities can threaten current and future global stability and, if not addressed, ecosystems can be irreversibly affected.

Essential Questions:

1. What are the proper ways to test water for temperature, pH, and dissolved oxygen?
2. What do macroinvertebrate and habitat assessments tell you about the quality of water in an area?
3. How do temperature, pH, and dissolved oxygen concentration interact and affect each other?
4. What are the ways we can keep our water clean and safe?

Activities:

1. Students will learn how to properly use water testing kits that determine water temperature, pH, and dissolved oxygen concentration.
2. Students will learn how to perform a habitat assessment and macroinvertebrate assessment to determine the quality of a body of water.
3. Students will learn the importance of water preservation and quality to the environment.

Resources:

Water Quality Testing Kits (pH and dissolved oxygen)
Thermometers
Habitat Assessment Field Data Sheet
Kentucky Water Watch Biological Monitoring Assessment Report w/
Macroinvertebrate Taxa Groups
Nets
Pans
Beakers
Tap Water

Procedure:

Day 1 – Students will be given background knowledge on how to use water quality assessment equipment (temperature, pH, and dissolved oxygen). Students will practice with equipment on various water samples provided by the instructor.

Day 2 - - Students will be divided into groups of 3-4. Each group will be given a beaker full of tap water. Each group will test the water quality (temperature, pH, and dissolved oxygen). Groups will record their results in the data table. Students will also be instructed on how to perform a habitat assessment and macroinvertebrate assessment.

Day 3 – Students will be divided into groups of 3-4 and taken to the pond on school grounds. Each group will test the water quality (temperature, pH, and dissolved oxygen), perform a habitat and macroinvertebrate assessments. Each group will record their data in the data table.

Day 4 – Students will return to the pond, in their groups, and continue water testing and assessments. Groups will take turns testing the pond water until all groups have done all four tests, macroinvertebrate assessment, and habitat assessment. Each group will record their data in the data table.

Day 5 - Students will be divided into the same groups of 3-4 and taken to a stream running through school grounds. Each group will test the water quality (temperature, pH, and dissolved oxygen), perform a habitat and macroinvertebrate assessments. Each group will record their data in the data table.

Day 6 – Groups will return to the stream, in their groups, and continue water testing and assessments. Groups will take turns testing the pond water until all groups have done all four tests, macroinvertebrate assessment, and habitat assessment. Each group will record their data in the data table.

Day 7 – Group data will be compiled into a class data table. Students will analyze finding and observe and trends. Students will determine how temperature, pH, and

dissolved oxygen concentration interact and affect each other. Students will also be instructed on water quality issues (what causes water quality to fall, how to keep water safe, how to keep water from being polluted).

Day 8, 9, 10 – Students will complete a web quest over water quality and present their findings to the class. (<http://asterix.ednet.lsu.edu/~edtech/webquest/mission.htm>)

Evaluation:

40% - Students will be evaluated on their proper use of lab equipment.

40% - Students will be evaluated on their web quest project.

10% - Students will be evaluated on their participation during group work.

10% - Students will be evaluated on their behavior while in the field and the computer lab.

