



Simulation 2

Bioindicators and Water Quality in the Chesapeake Bay Watershed

Name _____ Date _____

Background

The quality of a water environment affects the organisms that live there. Conversely, the organisms that live in a water environment are an indication of the quality. If the water quality is known, the type of organisms found there can be predicted. Or if the organisms are known, the water quality can be predicted.

Using living organisms to assess water quality is called a “bioassessment.” Those living organisms used are called “bioindicators.” Bioindicators record the *impact* of varying environmental conditions. A bioassessment provides a historical perspective on the condition of the water body, unlike the instantaneous view given by chemical sampling of abiotic factors. Bioassessments can tell us about water quality because of the different tolerances of organisms to environmental conditions.

This simulation is a “Match Game.” Eight different sites in the Greater Richmond area have been chosen. All are a part of the Chesapeake Bay Watershed and have an impact on the Bay itself. Some information (abiotic factors) is known about the water environment on that particular day. Compare that water environment with the “Organism” cards. Water quality (abiotic factors) requirements are written for each “Organism.” The “Organisms” include macroinvertebrates, as well as some fish-vertebrates. Students will match the organism to the suitable environment.

Materials

Water Quality Cards
Organism Cards.

Procedure

1. Class is divided into groups of four or less.
2. Each group will receive one copy of “Water Quality” cards and one copy of “Organism” cards.
3. Place the eight “Water Quality” (8) environment cards on the desk or table.
4. “Organism” cards are divided between all students in the group.
5. Students will determine which “Organism” can live in the different “Water Quality” environments.
6. Rules: Each site must have at least one (1) organism. Record on the “Results” table below which organisms might be found in that environment. The same organism can be found in several environments.

7. Answer the questions in the “Discussion” section.
8. Write “Conclusion” statements for both conclusion sections.

Discussion

1. Where could the most organisms live? Why?
2. Where could the fewest organisms live? Why?
3. Tuckahoe Creek is a swamp. What effect does this have on the dissolved oxygen? Why?
4. Site 3, James River at Pony Pasture is on the falls of the James. Site 6, James River at Surry is downstream, closer to the Chesapeake Bay. Which one had a higher amount of dissolved oxygen? Why?
5. Dominion Virginia Power built Lake Anna for the North Anna Nuclear Power Station. The temperature of the lake water averages seven degrees higher than typical water temperature in that area. What effect would this have on the aquatic organisms? (Think about seasons.)

Conclusion

The term “biodiversity” is often used to describe the different kinds of life found in an environment. Write a statement connecting biodiversity with optimum water quality (abiotic factors).

Get the “Big Picture” Conclusion

Write a statement using the conclusion above to describe the impact of water quality and biodiversity from the watershed area of the Chesapeake Bay on the Bay itself. Include a sentence of how this might impact you, personally.

Extension

Describe the “Conclusions” above using “if, then” statements as a hypothesis.

1. If the abiotic factors in a freshwater environment are at optimum levels for most living organisms, then the biodiversity of living organisms in that environment will be (high, low).
2. If the abiotic factors in freshwater environments in the Chesapeake Bay Watershed are at optimum levels for most living organisms, then the biodiversity of living organisms in the Bay will be (high, low).

Look at a map of the Chesapeake Bay Watershed. Find the sites you analyzed. Name the river system of each site.

Results

	Organisms that can survive in that environment.
Site 1. Mathematics & Science Center Pond	1. 2. 3. 4.
Site 2. Three Lakes Park-Henrico County	1. 2. 3. 4.
Site 3. James River-Pony Pasture-City of Richmond	1. 2. 3. 4.
Site 4. Swift Creek-Chesterfield County	1. 2. 3. 4.
Site 5. Rappahannock River	1. 2. 3. 4.
Site 6. James River-Surry, Virginia	1. 2. 3. 4.
Site 7. Lake Anna	1. 2. 3. 4.
Site 8. Tuckahoe Creek	1. 2. 3. 4.