

## Spring Water Quality

## Teacher's Guide

**Subject:** Integrated Science (Life; Earth-Space; Physical)

**Topic:** Record keeping and sampling of abiotic factors within an ecosystem.

**Summary:** Students will use various types of equipment to explore selected parameters of water quality to gain a better understanding of the dynamics of the abiotic factors influencing spring waters.

**Objective(s):** After completing the field lab, students will be able to:

1. Describe the characteristics of spring water.
2. Use water quality equipment properly and record data using proper units of measurement.

**Ecosystem(s):** Spring head

### Equipment:

- First Aid Kit
- Safety goggles
- Gloves
- GPS unit
- Dissolved Oxygen kit
- Armored Thermometer
- PH Probe
- Secchi Disk
- Eye Dropper
- Lens or tissue paper
- Waste container
- Clean water squeeze
- Data Sheet & Clipboards

### Background:

- Vocabulary: Parameter, abiotic, ground water, D.O.  
Reference Material: NERRS <http://www.nerrs.noaa.gov/Monitoring/Water.html>  
Data form adapted from CBA <http://www.basinalliance.org/>  
Methods adapted from Bayou side classroom <http://www.lumcon.edu/education/studentdatabase/>
- Equipment Training: Students should be given an overview of the equipment and importance of parameters before entering the field.

### Procedure (Engage; Explain; Explore)

1. Engage the students by asking specific questions that gets to the heart of the activity: What is an Abiotic factor? Name some abiotic factors. (water is one of them) If water helps organisms survive what are some characteristics of the water that we would need to test to determine the quality?
2. Explain the importance of each parameter and how it supports life.
3. Go over safety procedures. Wear gloves and goggles to protect skin and eyes, all waste should go into the waste container and be properly disposed of after returning from the field, etc.
4. Explore the following Parameters. Follow the procedures according to the directions for each instrument. (see bayou side classroom methods)
  - a. Take Longitude and Latitude, time of day, tide and weather conditions. Explain why it is important to note
  - b. DO: carefully add chemicals to the according to the directions of the test kit.
  - c. Temperature: hold the thermometer in the sample water within 1 minute of obtaining the sample
  - d. PH: use the PH pen or the PH test kit according to equipment instructions.
  - e. Turbidity: two students use the Secchi disk according to instructions.
5. Use the students' answers to ascertain what they already know, clarify any misconceptions, and then ask them to formulate their own hypothesis relating to their own expectations of the outcome of the lab.
6. Elaborate the prior discussion about abiotic factors. How do the parameters affect the survival of organisms within the water column? Evaluate the students understanding of the interconnectiveness of the ecosystem by answering the discussion questions.

### Sunshine State Standards:

**Science:** SC.D.1.3.3, SC.F.1.3.1.7.1, SC.G.1.3.4.7.2, SC.G.2.3.2.7.1, SC.G.2.3.2.7.3, SC.G.2.3.4.7.1

**Math:** MA.A.1.3.1, MA.A.1.3.2, MA.A.4.3.1, MA.B.3.3.1, MA.B.4.3.1, MA.B.4.3.2, MA.D.1.3.1, MA.D.1.3.2, MA.E.1.3.1, MA.E.3.3.1

**Geography/Social Studies:** SS.B.2.3.6 NATIONAL GEOGRAPHY STANDARDS: #4, #8

**Language Arts:** LA.C.1.3.1.7.1, LA.C.1.3.4.7.1, LA.C.1.3.4.7.4, LA.B.1.3.2.7.1, LA.B.1.3.2.7.3

## Spring Water Quality

## Student Data Sheet

### General Information

Full Name:		Date:	
School:		Teacher:	

### Student Hypothesis and Rationale

If the blue hole's water stays a constant temperature of 20<sup>0</sup>C when it is moving, and heats up when it is stagnant then the water in the blue hole today will be (warmer / cooler / the same) as usual because... \_\_\_\_\_

\_\_\_\_\_.

### Field Observations/Measurements/Data

#### My group's data

<b>Location:</b>	<b>Time:</b>	
<b>Latitude:</b>	<b>Longitude:</b>	
	<b>Weather Conditions:</b>	
<b>TEST</b>	<b>VALUE</b>	<b>UNITS</b>
Depth of measurement		meters
Water Temperature (thermometer)		Deg C
Dissolved Oxygen (Winkler test)		ppm
pH (pH test kit)		
Turbidity (secchi disk)		meters
Flow (flow meter)		Meters/sec

#### Other group's data

<b>Location:</b>	<b>Time:</b>	
<b>Latitude:</b>	<b>Longitude:</b>	
	<b>Weather Conditions:</b>	
<b>TEST</b>	<b>VALUE</b>	<b>UNITS</b>
Depth of measurement		meters
Water Temperature (thermometer)		Deg C
Dissolved Oxygen (Winkler test)		ppm
pH (pH test kit)		
Turbidity (secchi disk)		meters
Flow (flow meter)		Meters/sec

## Spring Water Quality

## Assessment

1. What was the temperature for your water sample?

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2. What was the flow of the water in the Blue Hole today? What is the difference of today's flow and the average flow? Name one cause of reduced water flow.

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3. Did your data support your hypothesis? What can you infer from the observations and measurements you recorded?

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4. What do you think would happen if the water stopped flowing? What would happen to organisms that are adapted to the parameters you observed today?

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5. If a prolonged rainstorm occurred and loose soil and other run-off sources were allowed to flow into the spring which water quality measurement would most likely be affected and why?

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6. Think about the observations you have just made. Did the activity raise new questions? Write a short question (start with "What, Why, Where, When, or How") about something you want to learn more about.

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