Teacher's Guide
Video Podcast: Measuring Water Quality

Southwest Florida Water Management District   Grade 6-8

This teacher's guide supports the SWFWMD video podcast episode *Measuring Water Quality*, available at WaterMatters.org/Podcasts. This guide includes Florida standards, Common Core Standards, vocabulary, suggested activities and links to additional resources.

Lesson Time: Approximately two hours (or two class periods)

Objectives: After learning about four parameters scientists test to measure water quality, students will test water and create a visual report that states and analyzes their test results. Students will learn how people's actions and different types of pollutants can affect the quality of water.

Vocabulary

Dissolved Oxygen (DO):	DO measures how much oxygen is dissolved in the water. A high DO value indicates there is plenty of oxygen for animals and plants to live. Only a few types of animals and plants can survive in low DO values
pH:	A measure of acidity ranging from 0 (extremely acidic) to 14 (extremely basic) with 7 being neutral. Most water is healthy in the range of 6.5–8.5
Pollution:	Contamination of water, soil, or air by harmful chemicals, waste materials and natural processes
Stormwater runoff:	Rainwater that picks up pollution as it washes over roads, parking lots, driveways, rooftops and other hard surfaces and washes into water bodies
Temperature:	A measurement of how hot or cold something is. Temperature affects dissolved oxygen, fish, plants and even microbes
Turbidity:	The degree of cloudiness of water caused by suspended solids. Turbid water contains a lot of debris, silt and other solids. Turbid water is often dark and murky making it difficult for plants to grow and for animals to breathe

1

Lesson

Teacher directions prior to beginning the lesson:

- Email WaterEducation@WaterMatters.org to order *free* water test kits from the SWFWMD. Each kit measures eight parameters (pH, dissolved oxygen, biochemical oxygen demand, temperature, turbidity, nitrate, phosphate, and coliform bacteria) and has enough test tabs to test each parameter 10 different times — for multiple water samples.
- Collect water samples. Samples from multiple sources work best. If possible, collect samples from a nearby water body or bodies, and ask students to bring tap water from home and/or use tap water from the school.
- Print the Water Quality Data Sheet provided.
- Display the pH scale provided at WaterMatters.org/pHscale (optional).

Engage:

(15 minutes) Prior to watching the podcast, pose the following essential questions to your students: <u>What can you tell about the quality of water by looking at it? What pollutants can affect water quality?</u>

Watch the podcast. Review the vocabulary terms and ask aloud the following questions to activate prior knowledge:

- Name the parameters measured in the podcast?
- What factors may cause changes in these parameters?
- How are different surface water bodies connected?
- How are surface water and groundwater connected, and how might pollution entering one affect the other?

Explore/Explain:

(45 minutes) Arrange stations with water test kits, water samples and the Water Quality Data Sheet. Then divide students into groups and assign one group per station. Have students conduct tests on turbidity, DO, temperature and pH, or all eight parameters if time allows. Instruct students to follow the step-by-step directions provided in the test kit and to record results on the Measuring Water Quality Data Sheet (page 5).

Extend:

(45 minutes) Students will create a water quality report, either individually or in their groups, to present and analysis test results. Using Word, PowerPoint, iBooks Author, Photo Story or a similar program, reports should —

1) Include where the water sample was collected
2) Record the test results on the data sheet
3) Discuss what types of pollutants may affect the results, if tap water was used, then results are probably good and you can ask students to speculate what could have caused the results to be poor
4) Discuss how people's actions (stormwater runoff) may have contributed to test results
5) Include multimedia components or visual elements (graphs, photos, etc.). Allow students to research the Internet for help and refer to the *ClipPix* and *ClipVideo* links below for images to include.

Evaluate:

(15 minutes) If time allows, ask students to present their reports to the class.

Additional Links

WaterMatters.org/WaterMonitoring

WaterMatters.org/Data/Water-Quality

http://etc.usf.edu/clippix/pictures/water-quality-testing/

http://etc.usf.edu/clipvideo/galleries/water-quality-testing/

WorldWaterMonitoringChallenge.org/Fact_Sheets_Handouts.aspx

Standards

Next Generation Sunshine State Standards:

SC.6.N.1.1: Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.

SC.7.N.1.1: Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.

SC.7.N.1.4: Identify test variables (independent variables) and outcome variables (dependent variables) in an experiment.

SC.8.N.1.1: Define a problem from the eighth grade curriculum using appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types, such as <u>systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.</u>

Common Core State Standards:

[CCSS.ELA-Literacy.SL.7.1](#) Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly.

[CCSS.ELA-Literacy.SL.7.2](#) Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.

[CCSS.ELA-Literacy.SL.7.4](#) Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation.

[CCSS.ELA-Literacy.SL.7.5](#) Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points.

[CCSS.ELA-Literacy.W.7.2](#) Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

[CCSS.ELA-Literacy.W.7.4](#) Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)

[CCSS.ELA-Literacy.W.7.8](#) Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.

[CCSS.ELA-Literacy.RI.7.1](#) Cite several pieces of textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

[CCSS.ELA-Literacy.RI.7.4](#) Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the impact of a specific word choice on meaning and tone.

Measuring Water Quality Data Sheet

Student Name: _____ Date: _____

Water sample collected from: _____

Time collected if known: _____

Test Conducted	Test Results	Most aquatic organisms prefer
Turbidity		Clear or slightly cloudy water
pH		Neutral 6.0 – 8.0
Temperature*		Cool to warm 55° F – 80° F
Dissolved Oxygen (DO)		4 parts per million (ppm) or higher for organisms living in water above 68° F

*Temperature conversion formula: Degrees C x 1.8 + 32 = Degrees F

Based on your results, circle the rating of your water sample:

A
Excellent habitat for most organisms
Preferred results on all four tests
B
Good habitat for most organisms
Preferred results on three out of four tests
C
OK habitat for some organisms
Preferred results on two out of four tests
D
Poor habitat for most organisms
Preferred results on one out of four tests
F
Unsuitable habitat for most organisms
Outside preferred range on all four tests