

Estuarine 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 estuarine waters and the inhabitants that reside in this ecosystem.

After completing the field lab, students will be able to:

- Objective(s):**
1. Describe the interaction of freshwater from rivers and seawater from the ocean as it meets in the estuarine environment
 2. Use water quality equipment properly and record data using proper units of measurement.
 - 3.

Ecosystem(s): Estuary

Equipment:

- Refractometer (salinity)
- Plastic test tube with pH indicator tablet, pH color range chart
- YSI Multi-meter (DO, salinity, temperature)
- GPS (latitude/longitude)
- Turbidity Tube (turbidity/clarity)
- Thermometer (temperature)
- Data Sheet & Clipboards

Background:

- Vocabulary: Parameter, Salinity, Estuary, D.O.,
- Reference Material: water measurements (USGS): <http://ga.water.usgs.gov/edu/characterisitics.html>
Padilla bay education curriculum: <http://padillabay.gov/educationcurriculum.asp>
- Equipment Training: Students should be given an overview of the equipment before entering the field.

Procedure (Engage; Explore; Explain)

1. Students walk to study area; half of the students go to site south of Guana dam and half north of Guana dam.
2. Engage the students by asking a specific question that gets to the heart of the activity: **How do you think the water will differ from an enclosed lake compared with an estuary (area where salt and fresh water mix)? If salinity in the ocean is usually 35ppt, what do you think the salinity in the estuary will be? What about the lake?**
3. 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.
4. Split students into two groups. The groups will test various water quality parameters using the equipment listed above.
5. One group will test north of the dam and the other group will test south of the dam.
6. Students will regroup and record data for both N and S of the dam so that all students have a complete data set.
7. After completing the lab, allow the students to compare results and answer the discussion questions as a group and explain their answers relating them to the concepts, processes and skills associated with the activity. Students should record their answers individually. At this time, facilitators can introduce/explain the specific concepts and explanations in a formal manner.

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

Estuarine Water Quality**Student Data Sheet****General Information**

Full Name:		Date:	
School (teacher):		Time:	

Student Hypothesis and Rationale

If the salinity of the ocean is 35ppt and the salinity of fresh water is usually less than 0.5 ppt, then I believe that the water in the estuary will have a (choose one: higher or lower) salinity in ppt than the ocean because _____
 _____ . I think the salinity will be _____ ppt.

Field Observations/Measurements/Data**My group's data**

Location:	
Latitude:	Longitude:
Tide Status:	Weather Conditions:
TEST	MEASUREMENT (Be sure to use correct units)
Water Temperature (Thermometer, YSI)	
Salinity (Refractometer, YSI)	
Dissolved Oxygen (YSI)	
pH (Test tube & pH tablet, pH color chart)	
Turbidity (Turbidity tube)	

Other group's data:

Location:	
Latitude:	Longitude:
Tide Status:	Weather Conditions:
TEST	MEASUREMENT (Be sure to use correct units)
Water Temperature (Thermometer, YSI)	
Salinity (Refractometer, YSI)	
Dissolved Oxygen (YSI)	
pH (Test tube & pH tablet, pH color chart)	
Turbidity (Turbidity tube)	

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Assessment

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

2. Which measurement differed the most between Guana Lake and S. Guana Dam? Why?

3. Was your hypothesis supported by your data? Whether your hypothesis is supported or not, what can you infer from your observations, measurements, and results?

4. What effects would a hurricane possibly have on the salinity in a nearby estuary?

5. Dissolved oxygen (DO) is necessary for aquatic species to survive. What are some causes for DO levels to drop/lessen in an aquatic environment? What effect would lower DO levels have on the fish living there?

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.
