

1. Title: Maintaining a Marine Aquarium in Your Classroom: Physical and chemical measurements
2. Concept: Measuring and Analyzing Water Quality Data.
3. Connecticut Science Standards
  - a. Scientific inquiry
  - b. Scientific numeracy
  - c. Science and technology: measuring tools
  - d. Structure and Function: Responses to Stimuli (5.2)
  - e. Science and Technology in Society Measuring Tools (1.4)
  - f. Science and Technology in Society Water Quality (6.4)
4. General Goal: Students will gain an understanding of how to measure & analyze water quality data in Long Island sound by setting up and maintaining a marine aquarium in the classroom that models a Long Island Sound ecosystem.
5. Required materials:
  - 10 gallon glass aquarium w/cover
  - Air pump & air stones
  - Outside filter (Whisper brand type)
  - Under gravel filter
  - Gravel (from local beach)
  - Seawater (from local beach or make your own using instant ocean)
  - Marine organisms (from project oceanology, Groton, ct or catch your own)
  - Thermometer or digital temperature recorder
  - Sea test density/salinity measurer or electronic meter
  - Dissolved oxygen test Kit or electronic meter
  - pH kit
6. Background: Setting up and maintaining a marine aquarium in you classroom is an excellent way for students to become familiar with ecosystems in Long Island Sound. The classroom aquarium will prepare them for actual field work by allowing them to become familiar with measuring techniques, measuring tools, data recording and with organisms they are likely to see.

7. Specific objectives: Students will:
  - Set up & maintain a marine aquarium
  - Understand basic water quality parameters
  - learn how to measure & record water quality data (dissolved oxygen, salinity, pH etc) in a science log book
  - analyze water quality data collected
  - develop an understanding of how a marine ecosystem functions
  
8. Engagement Techniques
  - work with students while measuring data
  - discuss log book with students periodically
  - assist students in graphing and analyzing data
  
9. Specific Outline of the Lesson:
  - Set up a 10 gallon marine aquarium using water from Long Island Sound. Stock tank with local marine species.
  - Discuss specific parameters to be measured and their importance to Long Island Sound.
  - Have students establish a log book to record data and observations
  - Have students take daily or weekly measurements of water quality data such as temperature, density, salinity, dissolved oxygen, pH, water clarity and water volume.
  - Students graph and analyze collected data.
  
10. Assessments:
  - Check student log books
  - Students create graphs of water quality data over time
  - Student's written analysis of trends in water quality parameters.
  
11. Extensions: Once a marine aquarium is set up in your classroom, it can be used as a springboard for many experiments. Just simply letting your students observe the aquarium for 10 minutes, while having them record what they see is a valuable experience. Using the organisms to practice identification and measuring skill will help if and when field work is done. Additional water quality tests can also be added such as nitrate, ammonia and others.

## 12. References

- a. Connecticut Sea Grant: <http://www.seagrant.uconn.edu/> CT Sea Grant is linked with NOAA and provides information about grants and education opportunities
- b. Project Oceanology, 1084 Shennecossett Rd, Groton, CT 06340  
<http://www.oceanology.org/>. Provides literature and help setting up marine aquariums. Field, lab and teachers manual available on CD.
- c. Long Island Sound Study: <http://www.longislandsoundstudy.net/>  
Information about a variety of issues dealing with Long Island Sound. Links to many other sites & organizations
- d. The Do it yourself Long Island Sound Biotype aquarium.  
<http://borntoexplore.org/aquarium/index.html>
- e. Connecticut College Arboretum. Tidal Wetland Ecology of Long Island Sound. <http://arboretum.conncoll.edu/publications/34/CHP3A.HTM>
- f. National Wetlands research Council: <http://www.nwrc.usgs.gov/>