

FRESHWATER QUALITY MONITORING

Driving Question

What impacts may agriculture have on water quality in our watershed?

Materials and Equipment

- Temperature Sensor
- Conductivity Sensor
- pH Sensor
- Dissolved Oxygen Sensor
- Turbidity sensor with interface (optional)
- pH calibration buffers, pH 4 and 10
- 5-gallon bucket, plastic, small
- Water sampling bucket or extension rod
- Labels and pens

Background

Water quality maybe affected by current agricultural practices. Run-off, as well as poor soil management may elevate concentrations of nutrients, fecal coliforms, and sediment loads. Over reliance or improper application of synthetic fertilizers could also lead to the degradation of our watersheds. Grazing and other agriculture practices may intensify erosion processes by raising sediment input into nearby water sources. Increased sediment loads make drinking water treatment more difficult while also affecting fish and macroinvertebrates.

Procedure

1. Select a site in a local watershed that has a creek or drainage ditch. Connect to the barometer sensor.
2. Open the AGR03 Water Quality.spklab lab file.
 - If the configuration file is not available create a digits display for each measurement shown in Table 1 after connecting the sensors.
3. Connect sensors (pH, conductivity, temperature, dissolved oxygen, and turbidity) and calibrate them according to the product manual.
4. Place the sensors into the water using the rod or collect a water sample using a 1-2L bucket and conduct the measurements onshore. Try to sample at least one meter from shore to avoid contaminating samples.
5. At site 1, place the sensors into the sample and allow 2-3min for the measurements to stabilize, then record the measurements in Table 1.
6. Repeat the steps for additional test sites. Follow the previous instructions and record your measurements.

Table 1: Site measurements and observations

Test	Temp (°C)	pH	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Turbidity (NTU) <i>Optional</i>
Site 1:					
Site 2:					
Site 3:					

Analysis

1. Dissolved oxygen levels below 3 mg/L indicate low water quality for many aquatic animals. Do you think the water you tested had enough dissolved oxygen to support most aquatic animals? Explain.
2. An acceptable range of pH for freshwater is 6.0–9.0. Does your body of water fall into this acceptable range?
3. Conductivity is a measure of salts dissolved in the water. Conductivity levels in a surface water body above 200 to 300 $\mu\text{S}/\text{cm}$ may indicate pollution by runoff from cities or agricultural regions. Does your water body show signs of pollution? If so, what do you think might be contributing to this pollution?
4. In the United States, turbidity levels higher than 1 nephelometric turbidity unit (NTU) in drinking water are unlawful, and the World Health Organization recommends levels lower than 1 NTU for drinking water. If the body of water you investigated served as a drinking water source, would the water have to be filtered to remove suspended solids? Explain.