# Monitoring the Quality of water

Driving Question

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

Materials and Equipment

|  |  |
| --- | --- |
| * Advanced water quality sensor with interface | * Buffer solution pH 10, 25 mL |
| * Labels and pens | * 5-gallon bucket, plastic, small |
| * Turbidity sensor with interface (optional) | * Long-handled sampling device |
| * Buffer solution pH 4, 25 mL |  |

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 Monitoring the Quality of Water lab file.

3. Connect the advanced water quality sensors (pH, conductivity, temperature and dissolved oxygen). Make sure your conductivity sensor is adjusted to match the level of conductivity of your water source (probably freshwater setting.)

4. Set up the data collection system to manually collect digits’ temperature, pH, conductivity, and dissolved oxygen (DO) readings for different site locations in a table. Define site location as the manually entered text data.

5. Use duct tape to secure the water quality sensor cables to the extension pole so the sensors dangle from the end of the pole.

6. At site 1, gently lower the sensors into the water at least 1 meter from the shoreline and at least 1/3 meter below the surface of the water. Record your data below

Table 1: Data collected at sites 1 and 2 “in situ” means on site.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Test | Temperature (°C) | pH | Conductivity (µS/cm) | Dissolved Oxygen (mg/L) |
| Site 1 – In situ |  |  |  |  |
| Site 2 – In situ |  |  |  |  |
| Site 2 – Sample |  |  |  |  |

7. Connect to the turbidity sensor. Fill a cuvette using water from approximately the same spot that you just monitored with the sensors. Label the lid of the cuvette “site 1”. Record your data here.

Table 2: Record Turbidity data and observations here. (optional)

|  |  |
| --- | --- |
| Site # Turbidity (NTU) | observations |
| 1 |  |
| 2 |  |

8. Walk to site 2 and describe the second test site. Follow the previous instructions steps 4-8 and record your data & observations in Table 1 & 2.

9. Extend the bucket out to approximately the same spot that you just monitored with the sensors and collect enough water to partially fill the bucket (¼ full is plenty).

10. Now test the bucket water just as you did on sites 1&2 and record the data in table 1 only.

Analysis

1. Based on your results, does the data collection technique (in situ versus sample) affect the results? Explain.

2. 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.

3. An acceptable range of pH for freshwater is 6.0–9.0. Does your body of water fall into this acceptable range?

4. Conductivity is a measure of salts dissolved in the water. Conductivity levels in a surface water body above 200 to 300 µS/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?

5. 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.