Connecting to the Chesapeake Bay
Post-Blandy Activity

Goal:

Objective: Students compare their water chemistry data with the larger Chesapeake Bay watershed. Student will describe trends/patterns in nitrate and make connections between land use and nutrient (i.e. nitrate) loading.

Teacher Background information on Nitrates

- Wastewater treatment plants contribute the majority of nutrients that enter the bay by releasing treated water—often still containing large amounts of nutrients—into local streams and rivers, which eventually flow to the bay.
- Nutrients that run off the land- including farmland and urban and suburban areas- come from fertilizers, septic systems, boat discharges, and farm animal manure.
- Air pollution from vehicles, industries, gas-powered lawn tools, and other emitting sources contribute nearly one-third of the total nitrogen load to the Chesapeake’s waterways.
- Scientists are most interested in the nutrients that are related to people living in the coastal zone because human related inputs are much greater than natural inputs. Because there are increasingly more people living in coastal areas, there are more nutrients entering our coastal waters from wastewater treatment facilities, runoff from land in urban areas during rains and from framing. All these factors can lead to increase nutrient pollution.

Elaborate/Extend

Procedure Part 1

Your students examined water chemistry at Blandy Experimental Farm and recorded their data. Water quality monitors, citizen scientists, and researchers use data such as these to learn about long-term effects on the overall health of the Chesapeake Bay watershed. With this activity, your students can connect the data they collected into the larger watershed.

Use the student sheet and the FieldScope activity to examine connections between nitrates and land use cover.

1. Open the Fieldscope map Nitrates in the watershed: http://chesapeake.fieldscope.org/v3/maps/333
2. Examine the legend (on the right hand side)
   a. What do the numbers in the green circles represent?
   b. What does the size of the circles represent?
3. Ask students to use the map to answer these questions-
   a. In what part of the Chesapeake Bay watershed do you observe high nitrate levels? What are some reasons you think this might occur?
   b. Record the range of nitrate levels in the Chesapeake Bay. (Find the highest observed level and the lowest observed level.)
   c. When nitrate levels are high, how do you think aquatic life is affected?
Procedure Part 2

1. Continue to examine the Nitrates on the FieldScope page.
2. Refer to your Blandy data sheet and put your nitrate reading(s) in the table below. Also record if this reading was above or below the accepted range and how many data points you took. (Refer to the class/group data.)
3. Click on the search function on the lower left side of the map. Type in ‘Blandy Farm, Boyce VA’ The map should fly in to Blandy. Zoom out (click on the ‘-‘ symbol) until you see a green dot that is sort of close to Blandy. Click on the dot to display info, click on ‘show in table’ and record data below.
4. Next, click on search function, type in ‘South Fork of Shenandoah’ and find the closest green dot and record the info.
5. Continue to use the search function to find other site names and record the data in the table.

<table>
<thead>
<tr>
<th>Site Name or Location</th>
<th>Nitrate reading (ppm)</th>
<th>Is this above or below the ‘accepted’ range?</th>
<th># of observations at this site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blandy Lake Georgette</td>
<td>0.5</td>
<td>Below</td>
<td>4</td>
</tr>
<tr>
<td>South Fork of Shenandoah</td>
<td>0.15</td>
<td>Below</td>
<td>2</td>
</tr>
<tr>
<td>Annapolis, Maryland</td>
<td>1.00</td>
<td></td>
<td>31</td>
</tr>
<tr>
<td>Washington DC</td>
<td>3.31</td>
<td>Above</td>
<td>9</td>
</tr>
<tr>
<td>Chapel Branch, Delaware</td>
<td>8</td>
<td>Above</td>
<td>3</td>
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Sample data table

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Students’ data sheet

6. Examine the data table.
   Are there multiple data points at each site? Which sites have many points/reading and which have only one?
   Based on what you have learned about collecting data, are all of these reading accurate? Why or why not, Use Evidence to support your reasoning.
   Zoom out on the map to look at the whole Chesapeake Bay. Where do you notice the highest nitrate readings? Is there a pattern that you notice? Hint: Look at major rivers and waterways.

Adapted from:
http://education.nationalgeographic.com/education/lesson/using-fieldscope-make-informed-decision/?ar_a=1
Chesapeake FieldScope project through National Science Foundation and National Geographic
Part 3 (or an Extension for some classes)

1. Click on ‘4. Select Map Layers’ above the map. Scroll to the ‘Land Cover’ icon and click ‘Add’.
2. Click ‘Next’ in the bottom right hand of screen. Then click on ‘show legend’. Type ‘South Fork Shenandoah’ again. What are the dominant types of land around that area?
3. Type Washington DC in the search bar again. What are the dominant types of land around that area? Zoom out: Look at the nitrate green circles and look at the type of land cover. Do you notice any trends or patterns, as to where the nitrate numbers are high and the type of land cover?
4. Do you notice and patterns as to where nitrate numbers are low and the type of land cover? Why do you think this is?
5. Describe what evidence supports your reasons?

Adapted from:
http://education.nationalgeographic.com/education/lesson/using-fieldscope-make-informed-decision/?ar_a=1
Chesapeake FieldScope project through National Science Foundation and National Geographic
Connecting your data to the Chesapeake Bay- Student Data Sheet

With this activity, you will connect the data you collected to the larger Chesapeake Bay watershed. Using your data and FieldScope, examine connections between nitrates and land use cover.

2. Examine the legend (on the right hand side)
   a. What do the numbers in the green circles represent?
   b. What does the size of the circles represent?
3. Answer these questions
   a. In what part of the Chesapeake Bay watershed do you observe high nitrate levels? What are some reasons you think this might occur?
   b. Record the range of nitrate levels in the Chesapeake Bay. (Find the highest observed level and the lowest observed level.)
   c. When nitrate levels are high, how do you think aquatic life is affected?

Procedure Part 2

1. Continue to examine Nitrates on the FieldScope page.
2. Refer to your Blandy data sheet and put your nitrate reading(s) in the table below. Also record if this reading was above or below the accepted range and how many data points you took. (Refer to the class/group data.)
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4. Next, click on , type in ‘South Fork of Shenandoah’ and find the closest green dot and record the info.
5. Continue to use the search function to find other site names and record the data in the table.

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Chesapeake FieldScope project through National Science Foundation and National Geographic

NOAA B-WET Project 2014-2017
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Based on what you have learned about collecting data, are all of these reading accurate? Why or why not. Use Evidence to support your reasoning.

Zoom out on the map to look at the whole Chesapeake Bay. Where do you notice the highest nitrate readings? Is there a pattern that you notice? Hint: Look at major rivers and waterways.

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