MAPPING OUR PARKS

Lesson 2: What are the land cover types in your watershed, and how do they impact stormwater runoff?

Overview

In the previous lesson you examined the watershed for your national park stream site.

In this lesson, you will examine land cover types in your watershed. Then you will estimate the amount of stormwater runoff produced by these land cover types.

In the next lesson, you will consider which organizations, agencies and neighbors should work together to manage stormwater runoff at your site. You will also compare management of your stream site with another national park stream site.

Materials

- FieldScope
- Pen or pencil
- *MOP Report*

Directions

1. Imagine it rains on your watershed. The rainwater will fall on many different types of land cover in your watershed. Use the steps below to examine these land cover types.
   - Launch FieldScope, display your site, compute your watershed and decrease watershed opacity to 0. Refer to Lesson 1 if you forget how to do this.
   - Open the **Layers** window, and show the *Land Cover* layer.
   - Click on the **Information** button to get the legend for this layer.
   - As a class or in small groups, discuss which land cover types are found in your watershed, which are the most common, and any patterns (for example, is all the forest in one part of the watershed?).
   - Close the **Land Cover** legend when you are done.

For most windows, if you cannot see all the information in a window, you can click on it and then hold the mouse down while moving it to the desired location. You cannot move "Area Details" windows that open when you use the Query Point or Query Polygon tools. For those you must move the entire map.

Some of the rain falling on your watershed may fall on natural land cover types such as forests and wetlands. Most rain falling on these areas absorbs into the ground and flows slowly *through* the ground to nearby streams. Rain may also fall on land cover types with impervious surfaces like concrete, pavement, roofs, and compacted soils. These surfaces are called impervious because they cannot absorb much or any rainwater. Instead, they produce stormwater runoff. Stormwater runoff is also called nonpoint source pollution because its source is not easily identified. Stormwater runoff flows *over* the land and down to nearby streams. It is a natural part of the water cycle. However, too much runoff can negatively impact stream ecosystems. It picks up and carries pollutants such as loose soil, oil, fertilizer, and trash to streams. The fast-moving runoff can erode stream banks and wash away stream organisms and their habitat.

2. As a class or in small groups, predict which land cover types in your watershed will produce a large amount of stormwater runoff and discuss why you think this. Then, look at the *Proportion as Runoff* values for each land cover type provided in column C of the *MOP Report's Your Watershed's Stormwater Runoff Table*. Compare these relative proportions to your predictions. Did any of these surprise you? Discuss these with your classmates.

3. Use the steps below to determine and record the proportion of your watershed covered by each land cover type. Round proportions to the nearest hundredth.

   - Click on the **Query Polygon** button  , and then click inside your watershed. When asked, click the **Use Watershed** button. An **Area Details** window will open. You may have to move your map (not just the window) to see the entire window.
   - Next to each land cover type is the proportion of the watershed it covers. Record these proportions in Column A of *Your Watershed's Stormwater Runoff Table* on your *MOP Report (2.1, page 4).* Note that you will have to add together several land cover types to match those provided in the table (*for example,* forest = deciduous + evergreen + mixed forests).
   - Close the **Area Details** window when you are done.

4. Next complete several calculations to determine the amount of stormwater runoff that flows to your stream site after a hypothetical rainstorm[1]. Follow the directions on pages 2 and 3 of your *MOP Report* (*2.1*) to complete these calculations and fill in *Your Watershed's Stormwater Runoff Table*. Be sure to round answers to the nearest hundredth.

[1] The hypothetical rainstorm has a rain depth of 5cm. This value is based on data from the NOAA National Weather Service (http://hdsc.nws.noaa.gov/hdsc/pfds/).

5. Water from your stream site (including any stormwater runoff) flows down to the Chesapeake Bay. Hide the *Land Cover* layer, and then zoom out and pan so that you can see your site and the Bay. Determine the shortest path and distance from your site to the Bay by first selecting the **Measure** button  , and then clicking once on your point to start a line and twice on the Bay to end the line. Record the distance shown on the middle of your line on your *MOP Report* (*2.2*).

6. Map the actual flow of water from your site to the Bay by clicking on the **Flow Path** button  , and then clicking on your site. Record the distance shown in the Flow Path window on your *MOP Report* (*2.3*). Also describe on your report (*2.4*) why this path differs from the shortest path you created in the previous step.

7. Zoom out until you can see the entire Chesapeake Bay watershed, which is outlined in blue. This is the entire area of land that drains to the Chesapeake Bay. Select the **Flow Path** tool, and then click on at least five sites in the watershed to see that all water in this area does flow into the Bay. Imagine that each site contributes stormwater runoff to the Bay. With your classmates, discuss how all this stormwater runoff might impact the Bay.

8. Answer the reflection questions, and then close FieldScope.

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Name: _____ Date: _____ Class: _____

Reflection Questions

1. Before Europeans settled in North America, the land in your watershed was primarily covered by forests and wetlands. Predict the difference in stormwater runoff between then and now (more, less or the same). Explain your prediction.

2. A stream site has very brown water, eroded stream banks, and very few stream organisms. What land cover types likely occur in its watershed? Explain how you know this.

3. Parts of your schoolyard likely produce stormwater runoff. Identify those parts. Then suggest a way to reduce this stormwater runoff, and describe why it would be effective.