NATIONAL GEOGRAPHIC

RESOURCE LIBRARY
ACTIVITY : 55 MINS

Land Cover in the Chesapeake Bay

Students investigate different types of land cover at different sites in the Chesapeake Bay using FieldScope maps and data. Students review the relationship between land use decisions, regulations, and water quality, and consider the site they will recommend for improving water quality in the bay.

GRADES

6 - 8

SUBJECTS

Biology, Ecology, Chemistry, Geography, Geographic Information Systems (GIS)

CONTENTS

6 PDFs

OVERVIEW

Students investigate different types of land cover at different sites in the Chesapeake Bay using FieldScope maps and data. Students review the relationship between land use decisions, regulations, and water quality, and consider the site they will recommend for improving water quality in the bay.

For the complete activity with media resources, visit:
http://www.nationalgeographic.org/activity/land-cover-chesapeake-bay/

DIRECTIONS

1. Motivate the need to explore land cover in the Chesapeake Bay watershed.

Ask students how they think land might affect water quality. You may need to prompt them with questions such as: *Which do you think is healthier to be in close proximity to: a stream, a forest, or large urban development? Why?* Tell them that different kinds of land use could be contributing to the varying levels of nitrates (as well as other pollutants) in the waterways. Distribute the worksheet, Analyzing Watershed Health: Land Cover to students. Read the three introductory paragraphs of the worksheet with students.

2. Have students analyze types of land cover in the Chesapeake Bay using FieldScope.

Tell students they will use FieldScope to examine different types of land cover around the Chesapeake Bay. Have students work in their project groups at computers for this exercise. Following the worksheet, Analyzing Watershed Health: Land Cover, students should complete:

- Part I: Explore land cover around the Chesapeake Bay.
- Part II: Examine land cover data at the selected sites.

Ask students to work on their Project Data Tables from the previous activities before they get to Part II, so they can record their land cover data directly onto that table.

3. Have students make a connection to the Chesapeake Bay Action Plan decision.

Remind the students that the action plan for the Chesapeake Bay watershed is designed to improve water quality. Ask students to reflect on how different land cover types might contribute more nitrates to the waterways than others, and to think about what sites would most benefit from this action plan.

Based on their land cover data and Stakeholder Table, students should consider a site, or sites, for the action plan. Distribute the Project Data Tables and Decision Statement Planner worksheets to each group. Have students complete Part III: Chesapeake Bay Action Plan Connection of their worksheet, Analyzing Watershed Health: Land Cover. They will need their Decision Statement Planner worksheets to fill out the third box. Note that the students will be entering their first pieces of information into the Project Data Table and the Decision Statement Planner. It is important for students to keep these two worksheets for the entire project, as they will use them for the rest of the activities in the unit.

Modification

Step 1: Ask struggling readers to annotate the readings by circling new vocabulary and underlining important phrases or sentences. They can also be paired with more confident readers to help to help them understand the text.

Tip

Step 2: Provide some support in interpreting the FieldScope maps by reviewing the legend and discussing any type of land cover that might not be familiar.

Modification

Step 2: Some students may need fewer sites to compare. Consider reducing the number of focus sites to three or four.

Modification

When working with FieldScope, some students may work better in partners or small groups.

Informal Assessment

Through discussion and responses on student worksheets, Analyzing Watershed Health: Land Cover, students will explain that different types of land cover can contribute pollutants to waterways in different ways.

Extending the Learning

Extension: Comparing Land Cover to Population Density

There are a couple of ways to compare layers of data in FieldScope. One way is to look at the layers on top of one another. The other way is to place the layers side by side. You are going to analyze the relationships between land cover and population density using both methods.

In order to compare two layers, however, you must have two layers to compare. In the Create Map Progress Toolbar, click on #4, *Select Map Layers*. Land Cover is already selected. Select Population Density as the second layer. Click Next to return to the map.

1. To compare the layers by placing one on top of the other, click on *Map Layers* on the toolbar to the left of the map. For both the *Land Cover* layer and the *Population Density* layer, there is a Transparency icon (next to the eye). When you click on this, a slider pops up, going from 0-100%. Move the slider along the continuum and make observations from the map.
2. To compare the layers using the Comparison Tool, click on the *Comparison Tool* on the toolbar to the left of the map. A slider pops up that allows you to show more or less of each layer. Move the slider along the continuum and make observations. When you are done comparing, click the *Stop Comparing* button under the slider.

What types of land cover are most common when the population density is higher? What types of land cover are most common when the population density is lower?

OBJECTIVES

Subjects & Disciplines

Biology

- Ecology

- Chemistry

Geography

- Geographic Information Systems (GIS)

Learning Objectives

Students will:

- analyze types of land cover in the Chesapeake Bay
- analyze and interpret data to investigate the relationship between land use and the types and amounts of nutrient runoff that may be produced
- reflect on the decision about what site to recommend for an action plan for improving water quality in the Chesapeake Bay watershed

Teaching Approach

- Learning-for-use

Teaching Methods

- Discovery learning
- Multimedia instruction
- Reflection
- Research

Skills Summary

This activity targets the following skills:

- 21st Century Student Outcomes
  - Information, Media, and Technology Skills
    - Information Literacy
    - Information, Communications, and Technology Literacy
    - Media Literacy
  - Learning and Innovation Skills
    - Critical Thinking and Problem Solving
- 21st Century Themes
  - Environmental Literacy
- Critical Thinking Skills
  - Analyzing
  - Understanding
- Geographic Skills
  - Acquiring Geographic Information
  - Analyzing Geographic Information
- Science and Engineering Practices
  - Analyzing and interpreting data
  - Constructing explanations (for science) and designing solutions (for engineering)
  - Obtaining, evaluating, and communicating information

National Standards, Principles, and Practices

NATIONAL COUNCIL FOR SOCIAL STUDIES CURRICULUM STANDARDS

• **Theme 3:**
People, Places, and Environments

NATIONAL GEOGRAPHY STANDARDS

• **Standard 1:**
How to use maps and other geographic representations, geospatial technologies, and spatial thinking to understand and communicate information
• **Standard 8:**
The characteristics and spatial distribution of ecosystems and biomes on Earth's surface

COMMON CORE STATE STANDARDS FOR ENGLISH LANGUAGE ARTS & LITERACY

• **Reading Standards for Informational Text 6-12:**
Key Ideas and Details, RI.8.2
• **Reading Standards for Informational Text 6-12:**
Key Ideas and Details, RI.7.2
• **Reading Standards for Informational Text 6-12:**
Key Ideas and Details, RI.6.2
• **Speaking and Listening Standards 6-12:**
Presentation of Knowledge and Ideas, SL.8.5
• **Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects 6-12:**
Research to Build and Present Knowledge, WHST.6-8.9

NEXT GENERATION SCIENCE STANDARDS

• **MS-ESS3: Earth and Human Activity:**
 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment
• **MS-LS1: From Molecules to Organisms: Structures and Processes:**
MS-LS1-5: Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.
• **MS-LS2: Ecosystems: Interactions, Energy, and Dynamics:**
MS-LS2-1: Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem

THE COLLEGE, CAREER & CIVIC LIFE (C3) FRAMEWORK FOR SOCIAL STUDIES STATE STANDARDS

• **Geographic Representations: Spatial Views of the World: D2.Geo.2.6-8:**
Use maps, satellite images, photographs, and other representations to explain relationships between the locations of places and regions, and changes in their environmental characteristics.

Preparation

What You'll Need

MATERIALS YOU PROVIDE

- Copies of Data Table (one per group of students)
- Copies of Stakeholder Table (from previous activities) (one per group of students)
- Copies of student worksheet (one per student): Analyzing Watershed Health: Land Cover
- Pencils

REQUIRED TECHNOLOGY

- Internet Access: Required
- Tech Setup: 1 computer per learner, 1 computer per small group, Interactive whiteboard, Presentation software

PHYSICAL SPACE

- Classroom
- Computer lab
- Media Center/Library

SETUP

Students either need to be at one computer independently or working in a small group. The space should have enough flexibility so groups can move between the computers and workstations easily.

GROUPING

- Heterogeneous grouping
- Homogeneous grouping
- Small-group instruction

BACKGROUND & VOCABULARY

Background Information

Nutrients enter waterways from both rural and urban areas via different processes and pathways. It is important to look at land cover around a site to determine how (and what type of) nutrients may be entering the waterways. Nutrients also travel through waterways from areas upstream of coastal sites, so it would be helpful to look at land use and land cover across the watershed to identify what land cover the water encounters on its journey to the bay.

Prior Knowledge

["Living organisms, including aquatic organisms, need oxygen to survive.","Oxygen gets into the water from the air, from other waters that mix with the bay, and from underwater plants that undergo photosynthesis.","Food chains and food webs can get disrupted when one organism’s population declines.","Nitrate levels can be high in rural and urban areas. In rural areas, a larger contribution of nitrates comes from animal waste and fertilizers. In urban areas, nitrates come from surface runoff."]

Recommended Prior Activities

- None

Vocabulary

Term	Part of Speech	Definition
deciduous	*adjective*	type of plant that sheds its leaves once a year.
dissolved oxygen	*noun*	measure of the amount of oxygen in a substance, usually water.
ecosystem	*noun*	community and interactions of living and nonliving things in an area.
land cover	*noun*	physical material at the very top surface of the Earth, such as grass.

Term	Part of Speech	Definition
riparian buffer	*noun*	area of grass, trees, or shrubs near a river bank.
stakeholder	*noun*	person or organization that has an interest or investment in a place, situation, or company.
water quality	*noun*	chemical, physical, and biological characteristics of water for a specific purpose such as drinking.
watershed	*noun*	entire river system or an area drained by a river and its tributaries.
wetland	*noun*	area of land covered by shallow water or saturated by water.

FUNDER

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