GOAL STATEMENT:
Students will develop an understanding of the size and importance of the Chesapeake Bay watershed. They will also recognize Maryland agriculture as an integral part of human life in the watershed.

OBJECTIVES:
- Students will interpret a map, identify states that contribute water to the Chesapeake Bay, and locate places of interest in Maryland.
- Students will research agricultural products grown in Maryland’s portion of the Chesapeake Bay watershed and share their findings with the class.

REQUIRED MATERIALS:
- Copies of “Chesapeake Bay Watershed Coloring Map” (1 per student)
- Copies of “Introduction to Maryland Agriculture” map and question sheet (1 per student)
- Copies of “Agricultural Product Research Guide” (1 per student)
- Colored pencils of at least 7 different colors
- Materials for research project: computers with internet access, reference books, poster paper, markers, etc.

AMOUNT OF TIME TO ALLOW:
Two 90-minute class periods. The lesson can be scaled back to one period if the research activity is limited to simple fact finding. Extension activities will take additional time.
Almost all of Maryland is located in the Chesapeake Bay watershed. A watershed is defined as the geographic area of land from which water drains to a specific body of water. Thinking about a shed can help you understand what a watershed is. The water that falls onto one side of a shed roof flows in one direction, and the water that falls on the other side of the roof flows in another direction. In this analogy, the shed is the dividing line between two watersheds. The same thing happens when a large divide, like a mountain, creates two or more distinct areas where water flows.

The Chesapeake Bay watershed is very large: it encompasses more than 64,000 square miles. It includes all of Maryland (with the exception of part of Garrett County) and parts of Pennsylvania, Delaware, Virginia, New York, West Virginia, and Washington, DC. Many rivers flow into the Chesapeake Bay. Human activities in any part of the watershed can ultimately affect water quality in the Bay. Maryland employs many conservation strategies to make sure the Bay stays clean.

The Bay is an estuary — an area where fresh water from rivers mixes with salt water from the Atlantic Ocean. Estuaries are extremely important ecologically because they tend to have high concentrations of nutrients and other conditions that are ideal for supporting a wide diversity of plant and animal species. For this reason, Maryland enjoys a booming seafood industry. Maryland’s seafood industry is considered to be part of agriculture because it provides food for people. (This lesson focuses on exploration of agricultural products from plants and animals produced on land. Another lesson in this curriculum, Something Fishy, allows students to investigate Maryland’s seafood industry.)

Agriculture is Maryland’s top industry in terms of dollars contributed to the state’s economy. Agriculture makes up a major portion of the land use in every Maryland county and is especially important in rural counties. Maryland agriculture includes plants and animals raised and harvested for food as well as a variety of other economic sectors including forestry, landscape plant production, and the horse industry. Almost all of the agriculture in Maryland takes place within the Chesapeake Bay watershed.

Because agriculture is such a widespread land use within the Bay watershed, people who work in careers related to agriculture strive to incorporate a variety of practices that help to minimize negative environmental impacts. People who work in agriculture utilize best management practices (BMPs) to help maintain and improve soil and water quality. These practices help to conserve and improve the health of the Bay and its tributaries.

Ask students to raise their hands if they know someone who has a shed at home. What are the functions of a shed? (Sheds protect our possessions from the weather. They keep water from coming into contact with our possessions by redirecting precipitation.) What direction does water move when it hits one side of a shed roof? What about the other side? Relate this analogy to how a watershed functions on land. The highest point in an area of land is called a divide because it separates the direction of water flow and creates different watersheds.

Give each student a copy of the coloring map and a Maryland map. Ask students to locate the Chesapeake Bay and to identify states that are to the north, south, east, and west of the Bay.
Part A. Introduction to the Chesapeake Bay Watershed (15 minutes)
This activity will help students become familiar with the Chesapeake Bay watershed and give them practice interpreting map features.
1. Give each student a copy of the Chesapeake Bay watershed map and colored pencils. Each student will need 7 different colors. Tell students to lightly color the portion of each state (the section that falls within the area outlined by a dotted line) that falls within the Chesapeake Bay watershed.
2. As students finish coloring their maps, quiz them by asking questions about the items listed on the “Facts About the Chesapeake Bay” handout. For example, you could ask “What do you think the average depth of the Bay is?” Continue quizzing the class until most students have finished coloring.
3. Have students match the numbers on the map with the correct names provided in the key. Students who finish the assignment quickly may identify other places of interest to them and write the names on their map sheets. Conclude the activity by sharing student ideas about important places in Maryland and reminding the class that the entire Bay watershed contributes water to the Bay.
4. Ask students whether they think it’s easy or difficult to protect the Bay from pollution and why. Lead the discussion to the idea that tributaries of the Bay come from a 64,000 square mile area and that it is extremely difficult to convince people, especially those who are far away from the Bay, that their activities can pollute the Bay.

Part B. Introduction to Maryland Agriculture (25 minutes)
1. Ask students to brainstorm a list of agricultural products grown in Maryland. Write their ideas on the board. Have students share facts they know about these products and their uses.
2. Distribute copies of the Maryland Agriculture map and the “Introduction to Maryland Agriculture” questions sheet.
3. Allow students to interpret the map and answer the questions. Review the correct answers.

Part C. Maryland Agricultural Product Research (45 minutes)
1. Distribute copies of the “Maryland Agricultural Product Research Guide.” Working individually or in small groups, have students choose an agricultural product produced in Maryland that they would like to research.
2. Allow each group time to research their product. They should use their research guides to help them collect and organize what they learn.
Part D. Presentation Preparation (45 minutes)
Allow time for students to utilize their research from day one to prepare a presentation about their product for the class. Provide students with guidance about the format their presentations should take (poster, oral, PowerPoint, etc).

Part E. Presentation Sharing (45 minutes)
Allow each group several minutes to share the most important findings about the product(s) researched. As an evaluation tool, you may choose to have other students list three important facts from each presentation. After each presentation, be sure to discuss and emphasize the interactions between agriculture and the natural environment within the Bay watershed. The ultimate goal of preparing and viewing presentations is to help students understand the importance of agriculture in Maryland and the interaction between Maryland agriculture and the environment.

Ask the class to think about positive and negative effects of agriculture on the environment. What types of environmental concerns did students identify in their research? Can they think of other environmental issues? Possible positive effects include providing food for deer and migratory birds and preserving open space. Possible negative effects include increased soil erosion and runoff of nutrients from fertilizer and manure into Bay tributaries. Students might also want to describe or research techniques used by farmers to reduce the negative impacts on the environment.

Interview someone who works in agriculture and ask him or her about techniques used to reduce the environmental impacts of farming. Findings may be shared with the class. Interviewing people who work in agriculture can also help stimulate student interest in agricultural careers.
Many students think that all people who work in agriculture are farmers. In reality, numerous non-farming careers are essential to the success of agriculture. Agriculture-related careers include:

- **Animal/Plant Farmer** — This person raises animals or plants that are important to Maryland consumers.
- **Greenhouse Operator** — This person raises plants in greenhouses to extend the growing season.
- **Agricultural Chemical Producer/Salesperson** — This person makes and sells agricultural chemicals such as fertilizers and pesticides.
- **Agricultural Marketing Specialist** — This person helps to advertise and sell agricultural products.
- **Equipment Dealer/Mechanic** — This person sells and repairs tractors and other equipment used in farming.
- **Textile Manufacturer** — This person uses fibers from cotton and other plants to make textiles for clothing and other products.
- **Agricultural Extension Educator** — This person develops programs that help educate farmers and other Maryland residents about agriculture.

### Evaluation

Student understanding can be evaluated through class discussion or assessment of completed activity data sheets. The following questions may also be used to evaluate student learning.

1. What is a watershed? What states are in the Chesapeake Bay watershed?
2. List four of the major agricultural products produced in Maryland.
3. How is agriculture in Maryland influenced by the Chesapeake Bay? How does agriculture in Maryland affect the Chesapeake Bay?

### References

Encyclopedias such as World Book and Britannica are excellent references for researching agricultural products. Online versions of many encyclopedias are available for student use.

Chesapeake Bay Foundation website, <www.cbf.org>.


Color the watershed in each state a different color.

**KEY**
- □ New York
- □ Pennsylvania
- □ Delaware
- □ Maryland
- □ Virginia
- □ West Virginia
- □ Washington, D.C.

Match these places in Maryland with the correct numbers on the map.

1. Annapolis
2. Baltimore
3. Cumberland
4. Bay Bridge
5. Ocean City
6. Salisbury
7. My home town
8. Washington, D.C.
Facts about the Chesapeake Bay

The Chesapeake Bay
• The Chesapeake Bay is an estuary, a body of water where fresh and salt water mix.
• The Bay is about 200 miles long, stretching from Havre de Grace, Maryland, to Virginia Beach, Virginia.
• The Bay is 3.4 miles wide near Aberdeen, Maryland and 35 miles wide at the mouth of the Potomac River.
• The Bay is, on average, 21 feet deep.
• The Bay and its tidal tributaries have 11,684 miles of shoreline—more than the U.S. West Coast!
• The Bay supports more than 3,600 species of plants, fish, and animals, including 348 species of fish, 173 species of shellfish, and over 2,700 plant species.
• The Chesapeake Bay is home to 29 species of waterfowl and is a major resting ground for migratory birds along the Atlantic Flyway. Every year, one million waterfowl spend the winter in the Bay region.
• The Chesapeake Bay is a commercial and recreational resource for the 17 million people who live in its watershed. It produces about 500 million pounds of seafood each year.

The Bay Watershed
• The Bay receives about half its water from the Atlantic Ocean. The rest drains into the Bay from its 64,000-square-mile watershed.
• The Susquehanna River provides about half of the fresh water coming into the Bay—an average of 19 million gallons of water per minute.
• The Bay watershed is home to about 17 million people.
• Everyone in the watershed lives within a few miles of one of the more than 100,000 waterways that drain into the Bay.
• Rain water can enter the soil and become part of the groundwater system that feeds into the Bay.

Bay Restoration
• The Chesapeake Bay was the first estuary in the U.S to be targeted for restoration because of damage due to human activity.
• Everything we do on the land — including the use of automobiles, fertilizers, pesticides, toilets, water, and electricity — affects our streams, rivers, and ultimately, the Bay.
• To restore the Bay, we all need to make changes in the way we live in our own communities, homes, and yards.

Adapted from the Chesapeake Bay Program website (www.chesapeakebay.net).
Introduction to Maryland Agriculture

Directions: Use the “Maryland Agriculture” map that accompanies this lesson to answer the following questions about Maryland agricultural products.

1. How many different kinds of agricultural products are shown in the legend of the map?

2. Some of the symbols represent animals or animal products. What kinds of animals are shown?

3. Choose any two counties in different parts of the state and compare/contrast the products they produce.

4. Broilers are chickens that people eat. What part(s) of Maryland produce most of the state’s broiler chickens?

5. Certain breeds of cattle produce milk that is used for dairy products. What part(s) of Maryland produce most of the state’s dairy products?

6. Field corn (corn for grain) is a special kind of corn that is dried and used for animal feed and food products for people. What part(s) of Maryland produce the most of the state’s corn for grain?

7. Write the name of the county where you live and list the main agricultural products raised there.

8. Some of the counties on the map are different colors. What do the colors represent?

9. Western Maryland has mountains, Central Maryland has rolling hills, and the Eastern Shore and parts of Southern Maryland have flatter land. What are some ways in which the shape of the land might affect the kinds of products grown?

10. Create your own question about the map. Write the question and the answer below.
Maryland Agricultural Product Research Guide

Name of Product: ____________________________________________________________

Description of plant or animal:

How is it used by people?

Varieties (different types):

University of Maryland Extension programs are open to all and will not discriminate against anyone because of race, age, sex, color, sexual orientation, physical or mental disability, religion, ancestry, national origin, marital status, genetic information, political affiliation, or gender identity or expression.
Maryland Agricultural Product Research Guide

Where it is grown and how much is grown in Maryland?

How is it grown (plants) or raised (animals)?

How is it harvested and/or processed?

Diseases and/or pests that affect it:

Environmental connections (positive or negative environmental impacts):