**Physical and Human Characteristics of the Chesapeake Bay Region**

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| **Science Standards**  *Virginia Standards of Learning*, 2018 | 6.8 Investigate and understand that land and water have roles in watershed systems. | |
| 1. a watershed is composed on the land that drains into a body of water; | |
| 1. Virginia is composed of multiple watershed systems which have specific features; | |
| 1. the Chesapeake Bay is an estuary that has many important functions; and | |
| 1. natural processes, human activities, and biotic and abiotic factors influence the health of a watershed system. | |
| ES.1 The student will demonstrate and understanding of scientific and engineering practices by | |
| 1. asking questions and defining problems | |
| 1. Interpreting, analyzing, and evaluating data | |
| 1. constructing and critiquing conclusions, and explanations | |
| ES. Investigate and understand that resource use is complex   1. use of Virginia resources has an impact on the environment and the economy | |
| ES.8 Investigate and understand that freshwater resources influence and are influenced by geologic process and activities of humans | |
| 1. stream processes and dynamics impact the major watershed systems in Virginia, including the Chesapeake Bay and its tributaries (sic) | |
| **Learning Outcomes** | * Describe the location and size of the Chesapeake Bay. * Explain how imagery and mapped data are alike and different. * Predict the influence of several factors, impervious surfaces, volume of water, vegetation, and cropland, on water quality in the Bay. | |
| **URL:** <https://arcg.is/1rOSTK> | |
| **Engage** | |
| ***Where is the Chesapeake Bay region?***  **→** Click the URL above to launch the map.  **?** How many states are included in the Chesapeake Bay Watershed?  **?** Which states in the watershed do not border the Chesapeake Bay?  **→** With the Details button underlined, click the button, Show Contents of Map (Content).  **→** Uncheck the Chesapeake Bay Watershed by State layer.  **→**  Zoom in and read Map Note 1.  **?** What river flows in the Chesapeake Bay here  **?** Why is this river important to the Chesapeake Bay? | |
| **Explore** | |
| **How big is the Chesapeake Bay?**  **→** Use the measure tool to measure across the mouth of the river near marker 1. (*ToolTip on next page)*  **?** How far is it from shore to shore at this part of the Chesapeake Bay?  **→** Turn off the USA Topo layer.  **→** Go to the Bookmark Button and select the Mouth of the Bay bookmark.  ? How far is it across the mouth of the Chesapeake Bay between markers 2 and 3.  ? How far is the distance using the Chesapeake Bay Bridge tunnel?  ? What is the water area of the Chesapeake Bay? Hint: measure tool, area.  **?** How do you think the size of the Bay would affect its ability to disperse pollutants? | |

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| **Explain** | |
| **How does land cover vary throughout the region?**  **→** Turn on the World Imagery (Clarity) layer. Use the bookmarks to zoom to each marker.  **→**Toggle between the USA Topo map and the Imagery to obtain additional information. Note: the topo map is not as recent as the imagery.  ? What do you observe at each of the markers  🞂 Natural bodies of water do not follow straight lines.  ? What is the body of water near marker 3? | |
| **Elaborate** | |
| **How does land use affect runoff into the Bay?**  **→** Turn on the Chesapeake Bay Land Cover layer. Click on the layer’s name and select the legend symbol.  🞂 Water cannot pass through an impervious surface such as cement and asphalt.  **?** Which Marker has a high concentration of impervious surfaces?  **?** How do impervious surfaces affect drainage?  **?** How would barren land affect runoff into the Chesapeake Bay?  **→** Click the Home button.  **?** Which areas of the Chesapeake Bay watershed are primarily forested? | |
| **Evaluate** | |
| **How does geographic scale affect data interpretation?**  **→** Turn on the Chesapeake Bay Watershed by State layer. Click on each state and examine the pop-ups.  **?** Which land use is predominant in most states? Second most prominent?  🞂 Cultivated cropland has the potential for fertilizer, herbicide, pesticide, etc. runoff into the bay.  **?** What is the state average of cultivated cropland for Virginia?  **→** Turn on the Cultivated Land by County layer and turn off all other layers.  **?** Where are the Virginia counties with a percentage of cultivated cropland higher than the state average located?  **?** To what extent do the agricultural areas border the Bay?  ***?*** How would the location of the cultivated areas affect plans to clean the bay? | |
| **MEASURE** | **BOOKMARKS** |
| * Click the Measure tool. * Select distance, and then choose the unit of measurement. * Click once to start measuring, click once to change direction, and double click to stop measuring. | * Click the button, Bookmarks. * Choose a bookmark name to zoom to a specified map location and scale. |
| **EXPLORE MORE** | |
| * Use the measure tool to determine latitude and longitude coordinates for the northernmost, easternmost, southernmost, and westernmost. Have students explain the criteria they used in determining those points. * For additional latitude and longitude practice, click Modify Map, then (Add button) Search for World Latitude and Longitude Grids (ESRI) in ArcGIS Online. * Have students compare the imagery and USA topo map layers to determine features no longer present on the landscape, e.g. Air Force base on the eastern shore. | |