Learn More About the Baltimore Floods Curriculum
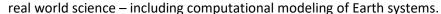
Overview

Baltimore Floods is a 6-lesson high school curriculum where students learn about the causes and consequences of flooding in urban areas. The curriculum addresses a current challenge and need for the development of scientific literacy in students. To develop scientific literacy, *Baltimore Floods* integrates teaching and learning of key ideas and practices of place-based environmental science with computational and quantitative science in authentic, innovative and effective ways. *Baltimore Floods* features learning experiences in the classroom and schoolyard that reflect the practices of real world science – including computational modeling of Earth systems.

Curriculum Arc

Baltimore Floods begins with students brainstorming how humans are impacting the causes (precipitation and runoff) and consequences of riverine flooding. Students then move through a series of physical, mathematical and computational models as they explore, in depth, how excess precipitation and excess runoff can lead to severe flooding events in their local streams. Finally, students are able to work in groups to redesign their schoolyard, City block or neighborhood to reduce the risk of flooding in their watershed.

Modeling and Computation

Baltimore Floods integrates data from real local storms and watersheds to engage students in their local environment, while also allowing for first hand data collection and analysis. We use an iterative approach that allows students to explore the content with several different modeling approaches that meet the needs of many different kinds of learners. For example, students learn about runoff by engaging with two types of physical models, an offline computational model where students conduct mathematical calculations of runoff ratios and finally, online runoff models of a real local watershed. Students also proceed through a series of hands on explorations in precipitation, runoff, infiltration and transpiration in their schoolyard.

Standards and Learning Goals

Baltimore Floods addresses a number of key NGSS standards and scientific practices. In addition, *Baltimore Floods* addresses a series of student learning goals in hydrology, data comprehension and computation.

Curriculum Components

Baltimore Floods is divided into six lessons. Pre and Post assessments are available to help gauge student learning. Each lesson begins with an overview page that includes the lesson summary, list of objectives and materials needed, followed by an outline of the lesson activities. Suggestions for preparing for the lesson and any safety concerns to consider for each activity are included. We have also included Key Vocabulary for each lesson activity, along with links to definitions. All student worksheets are attached at the end of each lesson or you can find links to those and other lesson resources on the Lesson landing page. Finally, we have included additional resources for teachers at the end of each lesson which can be used to develop extensions or to help the instructor become more familiar with each topic.

• **Lesson 1 – Introduction to Flooding**	Causes & consequences of flooding
• **Lesson 2 – Raining on Tiny Town**	Measuring and contouring rain in a physical model (basin)
• **Lesson 3 – Floorlandia: Topography and Watersheds**	Runoff on a 'tarp' landscape and on a table-top computational model
• **Lesson 4 – Models and Real Watersheds**	Runoff with infiltration in paint-trays and calculating runoff ratios
• **Lesson 5 – Field Explorations**	Measuring runoff, infiltration and transpiration in the schoolyard
• **Lesson 6 – Flood Mitigation Modeling and Planning**	Using simulation models that include transpiration, infiltration and surface roughness to consider ways to reduce flooding

View a video about the National CompHydro Project HERE

Questions? Contact: Alan Berkowitz at BESEducation@caryinstitute.org

FAQs

Contributions

Baltimore Floods was developed by the CompHydro Baltimore team consisting of educators and scientists from the Baltimore Ecosystem Study and the Cary Institute of Ecosystem Studies and with partners at Shodor, Colorado State University, University of Arizona and University of Montana. CompHydro Baltimore is also part of the larger CompHydro project supported by a grant from the National Science Foundation. CompHydro is a partnership between scientists, science educators and school systems at four locations across the U.S. – Baltimore (Maryland), Colorado, Arizona and Montana. For more information, visit our CompHydro Project Page.

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