

# Stormwater and Green Infrastructure in Boston Public Schools

## Curriculum Appendix F **Additional Resources**

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## The Charles River

### **Live Water Quality Data for the Charles River**

EPA Buoy in Charles River: Live water quality data for the Lower Charles River. Measurements taken every 15 minutes from a buoy outside the Museum of Science include turbidity, chlorophyll, temperature, and dissolved oxygen.

<https://www.epa.gov/charlesriver/live-water-quality-data-lower-charles-river>

### **A History of the Charles River**

<http://bujournalism.com/charlesriver/>

### **Annual Earth Day Charles River Cleanup:**

Join more than 3,000 volunteers from local schools, businesses, scout troops, and civic groups every April to pick up litter, remove invasive species, and assist with park maintenance along the Charles River and its tributaries. For more information or to register for this year's cleanup, visit:

<http://www.crwa.org/charles-river-cleanup>

### **Museum of Science Yawkey Gallery on the Charles River**

<https://www.mos.org/exhibits/yawkey-gallery-on-the-charles-river>

## Changing Cities

### **“Sponge Cities”**

<https://www.theguardian.com/world/2017/dec/28/chinas-sponge-cities-are-turning-streets-green-to-combat-flooding>, accessed 3/24/18

[http://worldwaterday.org/app/uploads/2018/02/fact\\_sheet\\_WWD2017\\_EN\\_2.pdf](http://worldwaterday.org/app/uploads/2018/02/fact_sheet_WWD2017_EN_2.pdf), accessed 3/24/18

### **Blue Cities**

<https://www.crwa.org/blue-cities>, accessed 3/24/18

## Climate Change

### **K-12 Science Lessons on Climate Change**

<https://www.climatecurriculum.com/>

## Climate Ready Boston

Report on Boston’s climate readiness and proposed actions with a short explanation of interactive maps on climate change, includes stormwater runoff

<http://www.greenovateboston.org/crb-maptool>

## newsela “Climate Change in the U.S. Northeast”

<https://newsela.com/read/govt-EPA-climate-northeast/id/28810/>

## Mapping Boston

Maps showing changes in sea level in Boston: 9,000, 6,000, and 3,000 years ago, 1630, today, and projections for 2100. Created by the City Archaeologist. Sasaki Krieger and Cobb, 2001. Institute of Maritime History.

<http://i.giphy.com/3o7ablb2jqPmab2s92.gif>

# Green Infrastructure

## Online Engineering Activities on Green Infrastructure

*Just Breathe Green: Measuring Transpiration Rates:*

[https://www.teachengineering.org/activities/view/usf\\_stormwater\\_lesson02\\_activity1](https://www.teachengineering.org/activities/view/usf_stormwater_lesson02_activity1)

Students put small native plants under plastic domes and measure the condensation over time. Then they calculate and graph the rates at which the plants breathe—their transpiration rates—and compare transpiration rates among different plant species.

*Does Media Matter? Infiltration Rates and Storage Capacities*

[https://www.teachengineering.org/activities/view/usf\\_stormwater\\_lesson02\\_activity2](https://www.teachengineering.org/activities/view/usf_stormwater_lesson02_activity2)

Students gain a basic understanding of the properties of media such as soil, sand, compost and gravel, and how these properties affect the movement of water (infiltration/percolation) into and below the surface of the ground. They design and test their own material mixes.

*Making “Magic” Sidewalks of Pervious*

*Pavement*[https://www.teachengineering.org/activities/view/usf\\_stormwater\\_lesson02\\_activity3](https://www.teachengineering.org/activities/view/usf_stormwater_lesson02_activity3)

Students use sand, pea gravel, cement and water to create and test pervious pavement. Groups create their own pervious pavement mixes, experimenting with material ratios to evaluate how infiltration rates change with different mix combinations.

*A Guide to Rain Garden Construction*

[https://www.teachengineering.org/activities/view/usf\\_stormwater\\_lesson02\\_activity4](https://www.teachengineering.org/activities/view/usf_stormwater_lesson02_activity4)

This activity culminates the unit (see activities above). Groups create personal rain gardens planted with native species that can be installed on the school campus, in the community, or at students' homes to provide a solution for flooding areas.

[Don't Runoff](#) video

Engineering Everywhere Special Report: Runoff video developed by Engineering is Elementary®, Museum of Science, Boston, used with permission. Also on YouTube  
<https://www.youtube.com/watch?v=3zmp4UXomaU>

[Role of Plants in Water Filtration](#)

[https://www3.epa.gov/safewater/kids/pdfs/activity\\_grades\\_4-8\\_plantsinwaterfiltration.pdf](https://www3.epa.gov/safewater/kids/pdfs/activity_grades_4-8_plantsinwaterfiltration.pdf)

## Stormwater Runoff

LID | Low Impact Development: A Design Manual For Urban Areas

Clear visuals, and succinct description of the environmental costs of urban sprawl; the need for better stormwater management; and the benefits of green infrastructure.

[https://s3.amazonaws.com/uacdc/LID-Manual\\_Excerpt.pdf](https://s3.amazonaws.com/uacdc/LID-Manual_Excerpt.pdf)

[Massachusetts Clean Water Toolkit, Urban Stormwater Runoff](#)

Excellent description of stormwater runoff, causes, effects etc.

[National Academies Press, Urban Stormwater in the United States](#)

Lengthy, detailed, and highly informative report on stormwater.

***Stormwater Center instructions on calculating pollution reduction loads***

<http://www.stormwatercenter.net/monitoring%20and%20assessment/simple%20meth/simple.htm>

## Water

### **Concord Consortium:**

Will There Be Enough Fresh Water? <http://authoring.concord.org/sequences/98>

Groundwater simulation. <http://has.concord.org/groundwater-movement.html>

Students explore the permeability of different layers and how water moves through these layers.

### **newsela : “The Water Cycle”**

A database of current event reading material that can be adjusted for different lexile levels, in English or Spanish.

<https://newsela.com/read/lib-nasa-water-cycle/id/24072/>

### **Waterworks Museum**

[www.WaterworksMuseum.org](http://www.WaterworksMuseum.org)

Tours, hands-on engagements, and curriculum-connected programs on the history of clean drinking water in Greater Boston. Learn about the legacy of engineering and science behind Boston’s drinking

water system stretching back into the mid 19th century and how this history shaped the public health and urban development of Boston.

### **World Water Day**

World Water Day, on 22 March every year, is about focusing attention on the importance of water. The theme for World Water Day 2018 is '[Nature for Water](#)' – exploring nature-based solutions to the water challenges we face in the 21<sup>st</sup> century.