

Watershed Explorations



Grade Level: 6-12	Time: 75 min
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Overview:

Participants will explore three (3) web maps to learn about watersheds, green infrastructure projects, and Green & Healthy Schools in the Milwaukee area.

Objectives:

- Describe and define a watershed.
- Describe at least two examples of green infrastructure.
- Identify at least three Green & Healthy Schools in the Milwaukee area.

Standards Alignment:

- Common Core – CCSS.ELA-LITERACY.RST.6-8.4, CCSS.ELA-LITERACY.RST.6-8.9, CCSS.ELA-LITERACY.WHST.6-8.9, CCSS.ELA-LITERACY.RST.9-10.4, CCSS.ELA-LITERACY.RST.11-12.4, CCSS.ELA-LITERACY.RST.11-12.7
- NGSS – MS-LS2-5, HS-LS2-7, HS-ESS3-4
- Wisconsin Standards for Social Studies – SS.Geog1.a.m, SS.Geog1.b.m, SS.Geog1.a.h, SS.Geog1.b.h

Materials:

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|---|--|---|
| <ul style="list-style-type: none"> • Computer or Chromebook • Internet access | <ul style="list-style-type: none"> • Maps for Education | <ul style="list-style-type: none"> • Paper • Pencil/Pen |
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Prep:

- Display the [Maps for Education](#) webpage at the start of lesson.

Background:

WATERSHEDS

Watersheds are the areas of land that drain into a body of water. Rain that falls over the Milwaukee River watershed (and does not **infiltrate** the ground), for example, drains into the Milwaukee River or one of its **tributaries**. Watersheds are important units to consider for people concerned about improving water quality because **stormwater runoff** carries pollutants from the land from the watershed into the river and ultimately, in our area, **Lake Michigan**.

Watersheds are separated from each other by local high ridges, like the tops of mountain ranges or hills. Waukesha is a city outside the **Great Lakes Basin** that has been allowed a diversion of Lake Michigan water across the subcontinental divide under a legal agreement known as the **Great Lakes Compact**.

GREEN INFRASTRUCTURE

Green infrastructure refers to human practices that mimic natural systems to manage stormwater. Green infrastructure is contrasted with “gray infrastructure” like culverts, sewers, pipes, and concrete channels. Examples of **green infrastructure** include rain barrels, rain gardens, bioswales, porous pavement, rainwater harvesting totes, and underground cisterns. All capture water before it flows into the sewer system.

Water in green infrastructure may be stored, slowed, re-used, absorbed by plants, or infiltrated into the ground. Green infrastructure helps to reduce water quantity within the **Combined Sewer Area**, where too much water too fast can trigger sewer overflows or basement backups. It helps improve water quality in the **Separated Sewer Area**, where stormwater runs off directly into rivers.

GREEN & HEALTHY SCHOOLYARDS

Many Milwaukee-area schoolyards are in poor condition and offer little if any green space. Schoolyards were originally paved to reduce lawn maintenance costs. Decades later, the deteriorating infrastructure is now costly to repair and furthermore, we now know that excessive hardscape impairs the environmental health of our city and the social-emotional health of our children. An increasing body of research underscores that students’ access to green schoolyards can result in better academic outcomes, increased engagement and enthusiasm, improved social-emotional skills, and decreased childhood obesity. Redeveloped schoolyards also offer many other benefits including improved stormwater management, urban biodiversity, community engagement, and meaningful STEAM (science, technology, engineering, arts, and math) curricular connections.

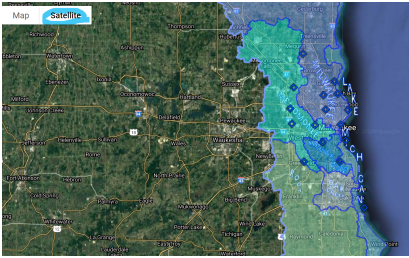
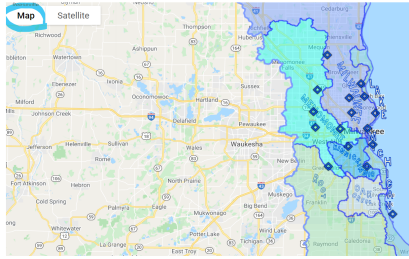
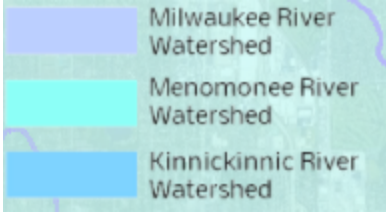
[Reflo](#) works with five Milwaukee-area schools per year in an intensive, collaborative process to design greener, healthier schoolyards. [Each project](#) is tailored to the specific needs and enthusiasm of the school's community but often involves replacing seas of asphalt with green spaces including bioswales, rain gardens, and trees. The placemaking designs go beyond simply removing pavement, however, to maximize triple-bottom-line (environmental, social, economic) benefits.

Note –

Reflo's [Maps for Education](#) web page provides nine (9) web map slices that are part of the larger, more comprehensive [Milwaukee Community Map](#) that includes [Story Layers](#) and [Basemaps](#) that can be toggled on and off in Google Earth according to custom inquiries. The Map in Google Earth also hosts [Deeper Dives](#)—educational exhibits into underwater research, local history, and efforts to improve water quality where you can more fully discover what makes Milwaukee a [Water Centric City](#). (The Map as a whole may be accessed for free via Google Earth Pro on Desktop. We also make several other slices available for viewing via web or mobile browser. For details refer to the website.)

Procedure:

Time	Activity & Details	Materials/Prep Notes
10 min	Introduction - Ask, "What is a watershed?" and elicit responses. - Review the "Watersheds" background information above. - Watch the Our Water, Why We Care video (2:02) to introduce watersheds and Milwaukee's local water story. - Explain that students will use a series of web maps, created in the Milwaukee Community Map, to explore watersheds, green infrastructure projects, and green schoolyards in the Milwaukee area.	Open the Our Water, Why We Care video (2:02)

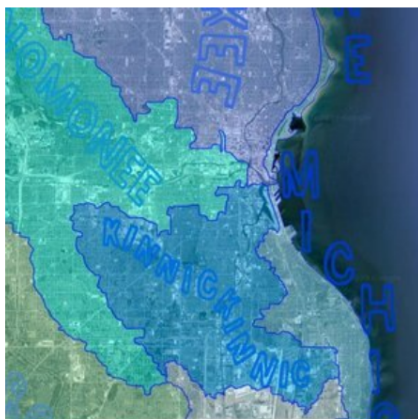
15 min	What is your watershed? - Click on the Watersheds & Landmarks map image. - Observe the six (6) different watersheds identified on the map. Each of these watersheds captures water and returns it to Lake Michigan. - Explore the map. - Use the + and - to zoom in and out. - Click on the blue icons () and find a landmark that is near your home. - Adjust the map view using the top left corner buttons to assist with orientation. - Identify the watershed you live in. - Repeat the steps above to identify which watershed your school is in. - Discuss ways you can help protect the health of your watershed(s). - Next, explore the Watersheds & Green Luminaries map to learn how others are protecting the health of our watersheds.	- Open the Watersheds & Landmarks map - Adjust the map view using the top left corner buttons to assist with orientation - Choose either Satellite or Map view - Turn Labels on or off  
20 min	Explore Green Infrastructure & Green Luminary Awards - Ask, "What is green infrastructure?" Elicit responses. - Review the "Green Infrastructure" background information above. - Click on the Watersheds & Green Luminaries map image. - Read the introduction to the MMSD Green Luminary awards on the landing page that highlights green infrastructure, education, and community engagement projects in the MMSD service area. - Click on the  button. - Explore the map. - Use the + and - to zoom in and out. - Adjust the map view using the top left corner buttons to	- Open the Watersheds & Green Luminaries map - Watershed legend  - Note – Green Luminary Awards are only found within the MMSD service area

	assist with orientation. ○ Note – only the Milwaukee, Menomonee, and Kinnickinnic River watersheds are shown on this map. ● Click on at least three (3) Green Luminary award icons () to learn how the community is protecting our local watersheds, Lake Michigan, and the Great Lakes. ● For each Green Luminary viewed, identify the - ○ Watershed ○ Organization(s) ○ Type(s) of green infrastructure used ○ Impacts ● Discuss the projects reviewed. ○ What types of green infrastructure were used? ○ How many gallons of stormwater are managed? ○ Are any of the projects located in your neighborhood? ○ Which projects inspired you? ● Next, explore the Watersheds & Green Schoolyards map to learn how local schools are using green infrastructure and other sustainability practices to transform their schoolyards to manage stormwater and provide many other benefits for students and the community.	
20 min	Explore Milwaukee's Green & Healthy Schoolyards ● Review the “Green & Healthy Schoolyards” background information above. ● Click on the Watersheds & Green Schoolyards map image. ● Read the introduction to Green & Healthy Schoolyards in Milwaukee on the landing page. ● Click on the  button. ● Explore the map. ○ Use the + and - to zoom in and out. ○ Adjust the map view using	● Watersheds & Green Schoolyards map ● Watershed legend  ● Note – Only Schoolyard Redevelopment Projects supported by Reflo are shown on this map.

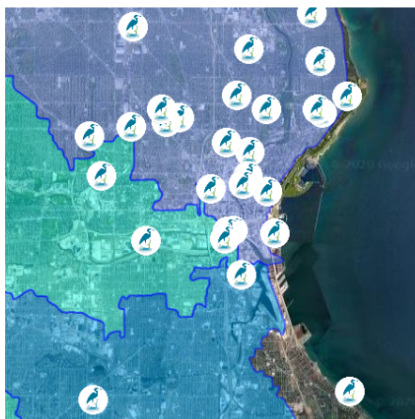
	the top left corner buttons to assist with orientation. - o Note – only the Milwaukee, Menomonee, and Kinnickinnic River watersheds and Schoolyard Redevelopment Projects supported by Reflo are shown on this map. • Click on at least three (3) Green & Healthy Schools icons () to learn how schools are transforming their schoolyards from seas of gray asphalt to green spaces with improved recreation, biodiversity, and green infrastructure features. • For each Green & Healthy School viewed, identify its - - o Watershed - o Key plan elements - o Stage of the redevelopment process • Discuss the projects reviewed. - o What types of green infrastructure were used or proposed in the plan? - o What are some common components of the plans? - o Is your school a Green & Healthy School? - o Are any of the projects located in your neighborhood? - o Which projects inspired you? • Watch the Summary of Cohort 1 Schoolyard Redevelopment Projects video (2:05) to see the transformation of and impact of these projects. • Encourage students to learn more about the Schoolyard Redevelopment Projects by exploring Reflo's website.	
5-10 min	Wrap Up • Review the definition of a watershed. Elicit participant definitions. • Challenge students to identify actions they may take to limit their negative impact on the health of their watershed and become a Green & Healthy School.	

- Encourage students to explore additional themes on the [Maps for Education](#) webpage or full [Milwaukee Community Map](#) to dive deeper into Milwaukee's water story.

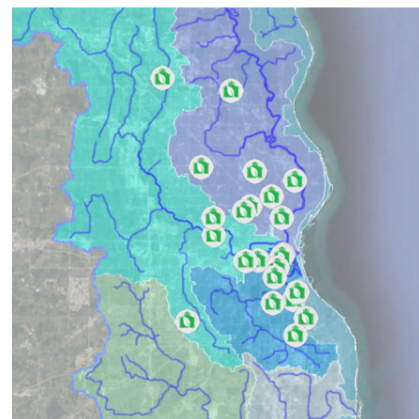
WHAT'S YOUR WATERSHED?



Watersheds & Landmarks



Watersheds & Green Luminaries



Watersheds & Green Schoolyards

Extension Activities:

- Watersheds & Landmarks - Watershed Data Representations**
 - Ask students to identify which watershed they live in.
 - Collect and analyze student responses.
 - How many of the watersheds are represented in the data?
 - Do students need to travel to a different watershed for school or work?
 - Create a visual representation that shows which watersheds students live in.
 - Share representations and discuss any trends observed.
- Watersheds & Landmarks - Part of the Great Lakes Watershed**
 - Open the [Watersheds & Landmarks](#) map. Zoom out to see the entire Great Lakes.
 - Ask your students what the line around the Great Lakes is. (It marks the Great Lakes Basin, which is the watershed of the Great Lakes.)
 - Ask your students if rain that falls in Madison or Waukesha or Milwaukee drains into the Great Lakes or Mississippi River and the Gulf of Mexico.
 - Watch the [Milwaukee Estuary Area of Concern Tour](#) video (2:45)
 - Discuss ways people have impacted the health of the Lake Michigan (and Great Lakes) watershed.
 - Ask students to identify action steps they can take to protect the health of our local watersheds and the Great Lakes Basin.
- Watersheds & Green Luminaries - Thank You Note**

- Open the [Watersheds & Green Luminaries](#) map.
 - Ask students to choose a Green Luminary project that inspires them.
 - Ask students to write to the entity to thank them for being a “Green Luminary.” Encourage students to ask questions of the entity to spark a conversation to learn more.
- **Watersheds & Green Schoolyards - Deeper Dive**
 - Open the [Watersheds & Green Schoolyards](#) map.
 - Choose a school and dive deeper into their schoolyard redevelopment project.
 - Click on the school name and review its page on Reflo's website.
 - Review conceptual plan documents, concept drawings, and other resources to better understand the holistic approach to the process.
 - Plan to visit one and of the completed schoolyards (Pilot, Cohort 1 and 2 schools) and check out their new green space yourself.

References/Resources:

- [Milwaukee Community Map Web Maps for Education Discussion Guide](#)
Use this discussion guide to investigate all nine Maps for Education. Explore Watersheds, Amazing Transformations, and Civic Awareness themes to learn more about Milwaukee's water story.
- [Milwaukee Community Map Teacher's Guide](#)
Use this Teacher's Guide for a more comprehensive investigation using the full version of the Milwaukee Community Map in Google Earth. The guide includes navigation tips, suggested activities and Easy Explore Pathways to facilitate your exploration in Google Earth.
- [Reflo's Schoolyard Redevelopment Projects](#) webpage
Learn more about the schoolyard redevelopment projects Reflo supports.
- [Green Schools Consortium of Milwaukee \(GSCM\)](#) webpage
Learn more about the Green & Healthy Schools community in the Milwaukee area. Join the GSCM network, sign up for the newsletter, and check out the [EcoLiteracy Challenge](#) to further engage students in water and sustainability focused activities.