

Air Quality and Environmental Remediation

Grade Levels: 6th - 8th

Standards Alignment

Grades 6-8 Michigan Science Standards (NGSS Aligned):

- MS-ESS3-3 - Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.
- MS-ESS3-4 - Construct an argument supported by evidence for how increases in human population and per-capita resource use impact Earth's systems.
- MS-ESS3-5 - Ask questions to clarify evidence of factors that have caused the rise in global temperatures over the past century.
- MS-ESS2-5 - Collect data to provide evidence for how interactions of air masses affect weather conditions in Michigan.
- MS-ESS2-6 - Develop and use a model to describe how unequal heating and Earth's rotation drive atmospheric circulation and climate.
- Engineering Design Standards:
 - MS-ESS2-1 - Model the cycling of Earth's materials and energy.
 - MS-ETS1-1 - Define criteria and constraints for a design problem considering environmental impacts.
 - MS-ETS1-2 - Evaluate competing solutions.
 - MS-ETS1-3 - Analyze test data to improve designs.
 - MS-ETS1-4 - Develop and refine models through iterative testing.

Materials

- Lesson Activity Guide
- Clipboards
- Pencils
- Wilson Park map

Lesson Vocabulary

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- **Air Quality Index (AQI)** - a standardized scale used to report daily air pollution levels and associated health risks
- **Environmental harm** – any temporary or permanent adverse (negative) effect on the environment caused by human activity
- **Environmental remediation** – the process of removing or neutralizing pollutants and contaminants from soil, groundwater, sediment, or surface water.
- **Climate resilience** – the ability of communities, ecosystems, and economies to absorb, accommodate, or recover from the negative effects of climate change
- **Native habitat creation** – the deliberate design and construction of built environments that specifically support local biological diversity, rather than displacing it.
- **Natural resources** – materials and substances that exist in nature without human intervention and are used to support life, build, and produce goods; generally divided into renewable and non-renewable resources
- **Green space** – an area of grass, trees, or other vegetation set apart for recreational or aesthetic purposes in an urban environment
- **Stewardship** – the responsible planning, management, and care of resources, property, or duties entrusted to one's care
- **Soft shoreline** – a nature-based, environmentally sustainable technique for managing riverbank erosion and shoreline habitat; typically uses natural materials, like rocks, gravel, trees, and soil to stabilize land.
- **Hard shoreline** – the use of man-made, rigid structures to protect coastal land from erosion or flooding; typically uses concrete seawalls or steel bulkheads to stabilize land

Pre-Visit Activities

Prepare your group for the field trip with these in-classroom pre-visit activities.

- **Just Air Presentations and Monitor Tracking**

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- Use this resource from our partner Just Air [here](#). Learn about the Air Quality Index (AQI), environmental justice, how to understand air quality data and what to do about it.
- Track the air quality monitors on the [Southwest Greenway](#) and [Rosa Parks and W Jefferson](#).
 - Pick a cadence that works for your class to have them track it leading up to the field trip. Have them note the weather or different circumstances that day that might impact the air quality.
- **MEECS Air Quality Curriculum Videos**
 - Michigan Environmental Education Curriculum Support (MEECS) has ten video lessons guiding students through understanding the composition of air all the way to how to make decisions with air quality data. Consider showing them whole class or assigning them to watch on their own!
 - <https://thinktv.pbslearningmedia.org/collection/meecs/t/meecs-air-quality/>
- **Detroit Environmental Concerns Article Options (ELA and Science)**
 - Learn about the Detroit Environmental Agenda. Look through their beliefs, the issues they fight for, and the organizations they work with. <https://www.detroitenv.org/>
 - Read “Detroit Is the Nation’s Most Challenging City for People with Asthma, a New Report Suggests” by K.R. Holloway. Have students chart the causes and suggested solutions in this article. <https://insideclimatenews.org/news/06102025/detroit-asthma-climate-change-pollution/>
 - Look through articles on various environmental topics covered by Planet Detroit. Consider separating students into groups, each researching a different topic, then presenting on the topic. <https://planetdetroit.org/>
- **Books** – The following books are available through the Detroit Public Library. Both fiction and non-fiction books create opportunities to introduce difficult concepts in the classroom; consider adding these books to your classroom library before or after the field trip! These books are more generally about the

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climate crisis but offer connection to the learning around air quality and environmental remediation students will engage with on their field trip.

- *Climate Is Just The Start* by Mikaela Loach – This is a guidebook for kids written by a prominent climate activist who inspires kids to feel empowered to change the world.
- *Fighting in a World On Fire: The Next Generation’s Guide to Protecting the Climate and Saving Our Future* by Andreas Malm – This is a young adult adaption of Andreas Malm’s best-selling book guiding young people to halt climate destruction.
- *A Catalog of Burnt Objects* by Shana Youngdahl – This is a young adult-climate fiction story of a girl struggling to figure out her new romantic relationship, her estranged brother, and her own life as wildfires surround her California town.
- *Saving Earth: Climate Change and the Fight for our Future* by Olugbem Rhuday-Perkovich – This is a guide for young readers about the history of our fight against climate change and how young people today are rising to action.
- *The 21: The True Story of the Youth who Sued the US Government Over Climate Change* by Elizabeth Rusch – This book tells the true story twenty-one young people who felt empowered to challenge the US Government in the landmark lawsuit, Juliana v. United States.
- **Before and After Photos of the Riverfront**
 - Have students go to: <https://www.detroitriverfront.org/plan-your-visit/parks-greenways>
 - Students can click on any of the parks and greenways listed there and scroll down to the Before and After photo sequence on each page
 - Prompt students to think about the big picture
 - Why did the land or river look like that prior to Riverwalk opening?
 - How are all living organisms impacted by how we care for the land and river?
 - How do you think the river ecosystem has changed since the Riverwalk opened?

- **Field/Nature Journal Observation Practice**
 - Set up a notebook to be the students' "Field Journal" or "Nature Notebook"
 - Consider setting a weekly (or other cadence) routine of going outside on the school ground for a nature walk
 - This will teach students to observe, record, and analyze
 - This will also help students grow comfortable being outside prior to the outdoors field trip
 - Listen and look for things that may contribute to poor air quality around the school.
 - Listen and look for things that may continue to contribute to good air quality around the school
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Lesson Sequence and Instruction

Arrival and Introduction (10 minutes)

- Begin your time at the park by encouraging students to take a moment to notice their surroundings, be present, and grow in mindfulness.
- Walk to the dock of the **Huron-Clinton Metroparks Water Garden** and gather in a circle.
- Encourage students to find a spot along the railing to look outward towards the **Water Garden**.
- Begin with this guided mindfulness activity to help students connect to nature:
 - Tell students you will count from 10 to 0. When you get to 0, quiet your voices and find something in or around the **Water Garden** to focus on.
 - As you find something to focus on with your eyes, take note of your body.
 - How does the "outside feel"? Can you feel the sun touching your skin? Is there wind or rain? How does it feel on you?

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- Now focus on your hearing? What sounds stick out to you? Can you hear any birds or animal sounds? What about the sounds of a city? Can you hear cars or humans? Is the water making a sound?
- Now, finally focus back on the spot you picked. What color is it? Is it living or not living? Do you think it will look the same in all seasons?
- Have students turn back to the center of the circle to face the instructor
- Reflect and Share: Direct students to turn towards a partner next to them share something in nature they felt, heard, and saw.
 - Call on a few partners to share their observations aloud
- Key point to emphasize: Nature is all around us even in the middle of the city. Ralph Wilson Park is full of plants, animals, and a complex river ecosystem. This park was created for you to learn, grow, and enjoy. Let's learn about the ways the park is helping to improve the environment around us.

Paired Walking Tour of the Park (25 minutes)

- While students are gathered, pass out clipboards, pencils, the activity sheet, and the map of the park.
- Split students into groups of 2-3 to prepare for a tour of the park
- Tell students to use the activity sheet to guide them through the tour. Highlight the following prompts as they begin:
 - Have students read the definitions for environmental harm and environmental remediation at the top of the page.
 - Look around and listen to notice what may cause unhealthy air quality in this area.
 - Walk along the water's edge and notice the built shoreline. What evidence do you see of environmental harm? How might the shoreline help reduce the environmental harm.
 - Walk along the **Water Garden**. Notice the soil, the plants, the shape of the water's edge. Listen for birds or geese. This is Detroit River water. How might this be an example of environmental remediation?
 - As you tour the park, notice the built structures: the grills, railing, the **Sport House** (basketball courts), the comfort stations, the **Play Garden**,

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- etc. Are these examples of environmental remediation or more harm? Why?
- As you tour the park, notice the landscape: the hills, grass, trees, plants, shrubs, etc. Are these examples of environmental remediation or more harm? Why?
- Give students a time and a meeting point to come back to.
- Have the chaperones spread across the park to supervise.

Environmental Remediation at School/Home (15 minutes)

- As students come back together, pair them off into smaller groups (4-5 students)
- Direct students to take a minute to think of the land around their school, their home, or a nearby park/greenspace to them that they are very familiar with
 - Begin to think about what that place looks like, sounds like, feels like, and smells like
- Prompt students to begin thinking about ways to improve that land, and the air surrounding it.
- Offer suggestions
 - Picking up litter
 - Making no litter signs
 - Planting trees
 - Starting a community garden
 - Setting up a tent for extra shade
- Be sure to have students think and record WHY their solutions would be examples of environmental remediation

Closing Circle and Reflection (5 – 10 minutes)

- Bring students back to gather to share out some of the solutions they came up with for their schools, homes, or other park
- Consider asking students the following questions:
 - How is Ralph Wilson Park improving air quality?

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- What can Ralph Wilson Park do to continue to impact the environment in a positive way?
- What other places do you know of that need environmental remediation work?

Post Visit Extension Activities

Optional classroom activities to extend their learning from their field trip experience.

- **Air Quality Monitor Tracking (Science/Math)**
 - If students started this before the field trip, have them continue to track the air quality index and one or more monitors in Detroit.
 - Pick a timeframe (i.e. one month) and have them note the number each day.
 - Have them create a chart based on their collected data.
 - To extend the learning further, have them do the same for another air quality monitor in another city in the U.S. Chart the data and compare it.
 - Have students analyze the different data and discuss why air quality may be worse in one city versus another.
 - Questions to guide analysis and discussion of data:
 - Is there a certain time of day/month/year the air quality is worse?
 - What factors (weather, traffic, position near active factories, nearby green spaces, construction, etc.) might lead to changes in the air quality?
 - How does the wind, season, or temperature affect air quality?
- **Argumentative/Evidence Based Writing Piece (Science/ELA)**
 - After looking through their notes from their field trip and discussing what they learned, have students write a **claim-evidence-reasoning** argumentative piece
 - Students can make a claim about how the park improves or does not improve air quality, provide evidence both from their

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experience and research, and show reasoning through additional learning or research on the topic.

- **Environmental Justice: Pollution Mapping (Science/Social Studies/ELA)**
 - Provide a map of Detroit (or your local town/suburb) to each student
 - Have students work in pairs to color code places on the map that contribute to lesser and better air quality or are highly impacted by air quality
 - Example areas to highlight and key:
 - Highways
 - Factories and industrial areas
 - New construction zone areas
 - Areas with high amounts of demolition
 - Parks/green spaces
 - Schools
 - Hospitals
 - Once students finish highlighting sections off the map, begin analyzing why certain areas of the city are more affected by air quality and who is most affected.
 - Students can present their findings and analysis in several ways. Options:
 - Argumentative writing piece
 - Informative poster/video/ad campaign around air quality how to protect yourself
 - Letters to their city council member or the mayor's office arguing for more restrictions on things that contribute to poor air quality

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Walking Park Tour - Student Guide

Directions: With your partner, walk throughout Ralph Wilson Park. Observe and record evidence of environmental harm and environmental remediation.

Environmental Harm: any temporary or permanent adverse impact on the environment caused by human activity. Examples include air and water pollution, extreme flooding, deforestation, wildfires, habitat loss, or melting polar ice.

Environmental Remediation: the process of removing or neutralizing pollutants and contaminants from soil, groundwater, sediment, or surface water. It is essential of redeveloping a contaminated site and restoring damaged ecosystems.

Walk the river shoreline

Notice: litter rocky (soft) shoreline seawall (hard) shoreline

fish habitat (logs sticking out of the river) fish or birds

Evidence of harm: _____

Evidence of remediation: _____

Walk around the Water Garden

Notice: soil plants birds and/or insects shape of water's edge

Evidence of harm: _____

Evidence of remediation: _____

Walk around the built structures

Notice: grills railing basketball courts comfort stations

playground seating

Evidence of harm: _____

Evidence of remediation: _____

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Walking Park Tour - Student Guide

Walk around the landscape

Notice: hills grass trees plants, bushes, and shrubs

Evidence of harm: _____

Evidence of remediation: _____

Environmental Remediation at School or Home

Directions: With your group, brainstorm solutions to improve the environment around your school or home.

What does the space around your home or school look like, sound like, feel like, and smell like? How can you improve the land and air surrounding it?

Ideas

- Picking up litter
- Making no litter signs
- Planting trees
- Starting a community garden
- Setting up a tent for extra shade
- Our ideas:

Our Plan and Why