

ON THE AIR

2020

Follow up report to the Clean Air Partners Board
David Yarmchuk & Rebecca Davis

Key revision areas

On the Air (original)

- Paper & printable
- 7 Units
- 2 activities per unit
- 14 "45-minute" activities
- Few additional components (weblinks)

On the Air 2020

- Interactive online & printable
- 5 Modules
- 8-13 activities per module
- 51 activities ranging from 30 minutes to multiple days
- Assessments of learning
- Additional components (glossary, how to use, teaching techniques, etc.)

New Modules

1: Our Lungs, Our Air, Our Health

The Effects of Ozone Pollution on Human Body Systems

2: What's the Air Forecast?

Human Impacts, Weather, and the Story of a Code Red Day

3: Air Pollution in the Community

Combustion, Particulate Matter, and Community Health

4: Air & the Chesapeake Bay

Dead Zones, Deposition, and Nitrogen Pollution

5: Air & Climate Change

Rising Temperatures, Rising Tides

New Structures

How to use the curriculum

Teaching techniques

Differentiation guide

Accessibility guide

Rubrics and feedback guides

Assessments of learning

Interviews with Air Quality Champions

Glossary

Air Quality Champion in our Community

Name: Dr. Janet Phoenix
Title: Assistant Research Professor
Organization: George Washington University



How does your work relate to air quality?
I manage an asthma home visiting program. We provide education and tools for families to use to improve the health of their children with asthma. We provide vacuum cleaners to reduce allergic dust particles in the home, pest management for roaches and mice and dust mite covers for the bed. Many of the families we serve live in areas of the city where air quality is poor, because of close proximity to roadways. I also teach graduate students at George Washington University about how poverty and poor environmental conditions can contribute to poor health outcomes.

What motivates you to come to work every day?
It motivates me to know that the work we do helps families keep their children healthy. I also like training the future health care workforce.

How did your education lead you to the position that you have today?
I majored in Anthropology in college, and I studied how culture, beliefs and health intersect. That was a great foundation for medical school at Howard University. After medical school I studied at the Bloomberg School of Public Health at Johns Hopkins University.

What is your workspace like?
My office at George Washington University is in the middle of a densely populated urban center. Washington, D.C. When I am not conducting research, I am out in the city working with families of children with asthma. I also collaborate with organizations and agencies in the city that deal with asthma. Some of these agencies are responsible for improving housing conditions that make asthma worse like leaks and mold. I also work with agencies to write laws and enforce environmental regulations in order to keep people safer.

What accomplishment are you most proud of?
I am proud of forming a coalition called the Healthy Housing Collaborative. This group is working to improve housing conditions related to health for DC residents.

New look

On the Air

ACTIVITY PROCEDURES

- We strongly recommend that before beginning this or any other activity in this kit, students should view the CD-ROM video—*Forecast Earth: Air Aware* as an introduction to air pollution.
- Conduct an introductory discussion on air pollution reviewing key points made in the video—*Forecast Earth: Air Aware*. Use the following questions to guide your discussion:
 - What are some sources of air pollution, and other industries, truck?
 - What is one of the main human?
 - What are the two kinds of ozone?
 - It surrounds the earth's at the sun. Ground level ozone is "bad."
 - How can we tell when the air is bad?
 - code indicates the quality of the air?
 - Besides ozone, what is another pollutant?
- Point out that two main types of air pollution are ground level ozone and nitrogen dioxide. However, scientists recognize six air pollutants. In this activity, the class will focus on ground level ozone and nitrogen dioxide. Each team will focus on one of these pollutants, with each team focusing on a different pollutant which will serve to educate others about air pollution.
- Divide students into six teams. Give each team a set of materials and to return them to the classroom.
- Hand out the *Student Study Guide—What's the Air Doing?* and their *Student Study Guides* using the information from the video. Internet research is strongly recommended.
- Give students time to develop their own study guides to develop their own pictures cut out from magazines or printouts.
- Hand out the *Wanted for Polluting Our Air*. Students should complete the worksheet during class.
- Have student teams present their work to the class. Have them cover all the key points as presented in their *Student Study Guides* as a presentation check.
- Display all the *Wanted for Polluting Our Air* posters.



The Environmental Protection Agency (EPA) was established by Executive Order on December 2, 1970. President Nixon signed the Clean Air Act of 1970 into law on December 31, 1970. Under this authority, EPA has set national air quality standards for **ground level ozone (smog), particulate matter (soot), carbon monoxide, lead, sulfur dioxide,**

and **nitrogen dioxide**. The Act also directs the EPA to review the standards for each of these pollutants every five years. In simple terms this means that the federal government, in cooperation with the States, sets air quality standards that are supposed to help reduce air pollution and clean the air for all of our citizens. This is important because we now know that bad air can make us sick.



ON THE AIR:

On the Air 2020

Activity 5 (Elaborate): Particulate Matter in the Community

Activity summary: In this activity, students analyze data based on real world studies of the health effects of living near a roadway. Through their data analysis, they are able to make connections between particulate matter and the health of an entire community.

Standards Connect:
 DCI: LS2.C. Ecosystem Dynamics, Functioning
 SEP: Analyzing Data, Engaging in Argument from Evidence
 CCC: Cause and Effect

Warmup: Where does particulate matter come from?
 • Answer: power plants, fires, chemical plants
 • This is a review of content they've learned in their attention on sources of PM for this kit.

1. Frame the activity: Remind students that at an activity you asked if anyone lived in a neighborhood or a lot of trucks. Have them think about even if they don't live in one. Imagine you live there is a lot of particulate pollution. Ask student about it. They may suggest things like wear masks indoors. Tell students that one thing people do is to study the problems in their community and come up with solutions. In this activity, they will study how pollution can affect a whole community.

Community Health is Serious
 During this activity students will investigate soot (cardiovascular disease) which they may have heard of. Be sure to address this carefully and with the seriousness that topics like this deserve. While examining is fictionalized, it is based on actual studies. See the accompanying documents for more information.

2. Monitors vs. sensors: Remind students of the devices they used or built in Activity 3. Tell students to use PM monitors that are permanently installed to measure PM all the time. You can show them how. As citizen scientists, we can look up if monitors if we want to know how high the air quality is.

ACTIVITY DETAILS

TEACHER NOTES

Connection to Module 1
 If you have done Module 1 with students, you may want to skip over the AQI portion of the activity, or use this time to review what students have already learned about the AQI.

3. Looking up the current AQI: Tell students that there are a lot of different ways to find out what the current air quality is in their neighborhood or around the world. Pass out student computers (if available) or project a web browser where all students can see. With students, go to the Clean Air Partners website for current and forecasted AQI: <https://www.cleanairpartners.net/current-and-forecasted-air-quality>. Click on "current" at the top right corner of the map to see the AQI color in different places in the area. Click on the point on the map closest to where the school is. The page will scroll to the bottom where there is specific AQI data. You can also switch pollutants to see how the AQI changes.

Current Air Quality

Daily Max AQI

Ozone (8-hr Average)

On the Air 2020

Module 2: What's the Air Forecast?

New type of modules

- Phenomenon-based
- 5E model
- Inquiry-based
- Student-centered
- Authentic science

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5E Module Flow

Activity 1 (Engage): What's That in the Sky?
Timing: 30-45 minutes
Purpose: Introducing the anchor phenomenon

- ✓ Students will make observations and hypotheses, and ask questions to better understand the anchor phenomenon

Activity 2 (Explain): What is Weather?
Timing: 1-2 class periods
Purpose: Building background knowledge of weather terminology to determine if the phenomenon could be natural

- ✓ Students will understand the primary characteristics used to describe weather
- ✓ Students will use weather data to determine if the phenomenon is natural or man-made

Activity 3 (Explore): Pollution, Power Plants, and People
Timing: 60 minutes
Purpose: Determining whether the phenomenon may be man-made by looking at how humans impact the environment.

- ✓ Students will use maps to identify connections among air quality, population, and electricity production

Activity 4 (Explain): The Criteria Air Pollutants
Timing: 45-60 minutes
Purpose: Building understanding of different types of air pollution and the 6 criteria pollutants, in order to identify the anchor phenomenon

- ✓ Students will define air pollution
- ✓ Students will know there are different types of air pollution
- ✓ Students will identify the pollutants that are most important for us to consider
- ✓ Students will identify the pollutants that are most common in their area

Activity 5 (Explain): O₃, Oh My! Get to the Bottom of It
Timing: 30 minutes
Purpose: Understanding ozone and its effects on the environment

- ✓ Students will understand what ozone is
- ✓ Students will understand the difference between stratospheric and tropospheric ozone



Credit: Tomskyhaha / CC BY-SA

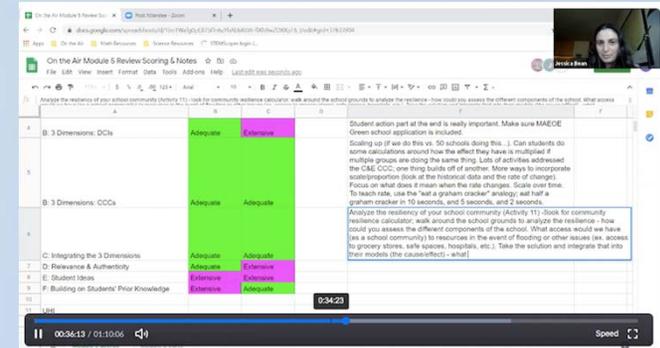
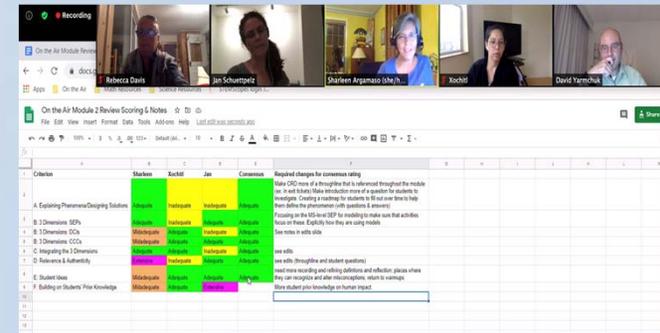
Feedback & Revision Process

Expert Review

- 10 reviewers (2-3 reviewers/module)
- 2-3 week review + 2.5 hour Zoom discussion

Teacher Focus Groups

- 15 teachers (2-3 teachers/module)
- 1 week review + 2 90-minute Zoom discussions



Highlights from the review process

“The activities were very engaging...whether it’s in class in-person or virtually, I thought that students could definitely engage in all of the activities.”

“It allows students to think. It allows students to put themselves in a different role...It allows students to think about solutions...It allows students to imagine and to be creative in reference to something that is real life. It’s relatable. I can see students going home having conversations with family members about what they’re learning in this module.”

“The graphics, the graphic organizers, the KWL chart...those things are always great for students who receive special education services.”

“I think most students in Middle School will appreciate this... [Teachers are] not so much looking for a curriculum but looking for a pathway that is explicit that gives you the guidance that you need. 5E model framework was great.” -

On the Air 2020 website



The Curriculum How to Use Resources About Clean Air Partners Contact

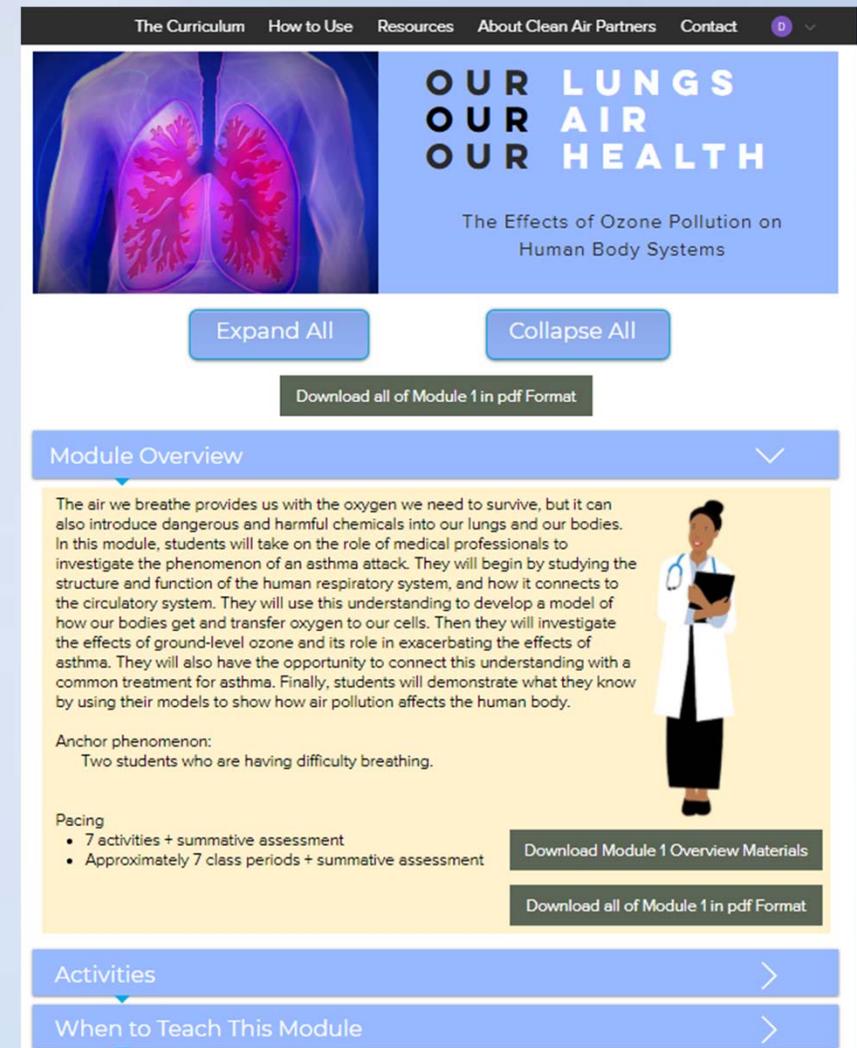
ON THE AIR 2020

A CURRICULUM RESOURCE FOR
EXPLORING AIR POLLUTION ISSUES AND SOLUTIONS

Welcome to On the Air 2020!

Your path to teaching air quality starts here!

Check out one of our 5 modules on air quality, or take an overview tour of the curriculum. Based on the time you have to teach, and the grade level of your students, you may teach the whole curriculum or you may pick and choose individual modules. The path is up to you!



The Curriculum How to Use Resources About Clean Air Partners Contact

OUR LUNGS OUR AIR OUR HEALTH

The Effects of Ozone Pollution on Human Body Systems

Expand All Collapse All

Download all of Module 1 in pdf Format

Module Overview

The air we breathe provides us with the oxygen we need to survive, but it can also introduce dangerous and harmful chemicals into our lungs and our bodies. In this module, students will take on the role of medical professionals to investigate the phenomenon of an asthma attack. They will begin by studying the structure and function of the human respiratory system, and how it connects to the circulatory system. They will use this understanding to develop a model of how our bodies get and transfer oxygen to our cells. Then they will investigate the effects of ground-level ozone and its role in exacerbating the effects of asthma. They will also have the opportunity to connect this understanding with a common treatment for asthma. Finally, students will demonstrate what they know by using their models to show how air pollution affects the human body.

Anchor phenomenon:
Two students who are having difficulty breathing.

Pacing

- 7 activities + summative assessment
- Approximately 7 class periods + summative assessment

Download Module 1 Overview Materials

Download all of Module 1 in pdf Format

Activities

When to Teach This Module

Next steps

- Rollout to review teachers (and others) w/ additional feedback, adjustments, images from the classroom
- Professional development with teachers (online training, videos, etc.)
- Presentations at conferences (MAEEOE 2021, etc.)
- Integration into school district-based online learning systems (ex. Canvas for DCPS)

Questions?



