



N.C. Air Awareness Annual Report July 2019 – June 2020

North Carolina
Department of Environmental Quality
Division of Air Quality
Planning Section
<https://deq.nc.gov/ncairawareness>



This annual report outlines North Carolina Department of Environmental Quality's Division of Air Quality (N.C. DAQ) work to inform North Carolina citizens about air pollution and how to reduce their impact on air quality which can benefit the entire community. The reporting period is in line with the state fiscal year (SFY) 2019-2020 and covers July 1, 2019 through June 30, 2020. The report highlights key elements of community engagement and outreach as part of the NC Air Awareness program.

The N.C. DAQ experienced several challenges in FFY 2019-2020 that impact the N.C. Air Awareness program; they include changes to staff, funding, and the coronavirus pandemic.

In May 2019 N.C. DAQ N.C. Air Awareness staff experienced staffing changes, losing two temporary employees who were instrumental in providing education and outreach to the communities in N.C. Two temporary staff were able to be hired later in August, and one able to become a permanent staff in January 2020.

In March 2020, the North Carolina Department of Transportation informed the N.C. DAQ that no additional Congestion and Mitigation and Air Quality (CMAQ) funding would be available for the remainder of 2020. The N.C. DAQ will pursue future CMAQ funding for 2021 and future years and began drafting project plans in September 2020. Additionally, other funding streams, normally available to N.C. DAQ through fuel taxes and Motor Vehicle Emissions Inspection and Maintenance (I&M) Program fees, have been adversely impacted by the coronavirus pandemic. Due to this funding loss the temporary staff member was cut.

On March 14, 2020, Governor Roy Cooper issued two Executive Orders 117 and 121 in response to the coronavirus (COVID) pandemic. In this order, mass gatherings of more than 100 people were banned, including parades, fairs and festivals; and K-12 schools were closed statewide. Order 121 directed all N.C. citizens to stay at home and limited gatherings to 10 people or less. This order also included many business closings. The N.C. DAQ acted accordingly and implemented teleworking for staff. With increased COVID cases across the state, K-12 schools remained closed and N.C. DAQ employees continued to telework. In August 2020, schools began reopening on a limited basis, most however continue to offer distance learning or virtual classroom instruction. The N.C. DAQ was still operating in a telework mode. Many of the in-person events the N.C. Air Awareness team attends and promote were cancelled and have not resumed.

Despite the many challenges, N.C. Air Awareness continued to support the Divisions goal of educating, informing, and engaging with citizens across the state to reduce air pollution through voluntary efforts.

HIGHLIGHTS



Education

- Provided direct environmental education to approximately 7,400 students
- Conducted 118 educational events from the mountains to the coast
- N.C. Air Awareness conducted over 300 educational programs and events statewide in 38 different counties.
- Taught efficient driving behaviors and vehicle technology to 22 Driver’s Education courses – totaling over 700 students
- Launched 2 new virtual education platforms, now live holding virtual education opportunities
- Launched two new pilot education programs, one in personal air sensors the other in renewable energy microgrid technology



Trainings/Workshops

- Conducted 4 full day air quality education workshops
- Held 7 half-day trainings with 154 participants
- 170 teachers and non-formal educators directly learned about air quality
- Launched a self-paced virtual air quality workshop approved for professional development and continuing education credits
- Presented at and/or tabled for 7 different educational events across the state



Community Events

- Attended, organized or were schedule to attend 29 community events across the state including environmental field days, festivals, and park events
- Reached several hundred older adults through “Know the Code!” project.
- Engaged an online community through new online platforms during the pandemic including blogs, Facebook posts



Partnerships

- Partnered with four different universities across North Carolina to reach citizens
- Successfully held or attended 29 partnership events this year
- We successfully collaborated with our partners in Mecklenburg and Forsyth counties during Earth Month and Air Quality Awareness in April/May
- Reached over 2,200 individuals through or with our partners this fiscal year

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INTRODUCTION

We are pleased to present the N.C. Air Awareness Annual Report for state fiscal year (SFY) 2019-2020 and covers July 1, 2019 through June 30, 2020. The N.C. Air Awareness annual report provides highlights of key air quality education and outreach efforts for the North Carolina Division of Air Quality (N.C. DAQ) and the stretch of our education efforts despite challenges, like the coronavirus pandemic.

From our network of local air awareness coordinators, environmental educators, partners and N.C. DAQ staff, we collected and compiled data regarding educational and outreach services to provide a snapshot of the types of engagement occurring as the result of this program and the scale of outreach efforts across the state. The report is segmented into three main categories including:

Education efforts – kindergarten through 12th grade school presentations and activities, and training and workshops for educators to increase students’ knowledge about air quality matters.

Community engagement efforts – participation in fairs, festivals, Earth Day celebrations and other local events to reach the public and increase knowledge about voluntary actions that can be taken to protect the air quality.

Partnership efforts – partnering with organizations to help their employees learn about air quality and ways in which to protect their health.

N.C. DAQ works with the state's citizens to protect and improve outdoor, or ambient, air quality in North Carolina for the health, benefit, and economic well-being of all. To carry out this mission, the N.C. DAQ operates a statewide air quality monitoring network to measure the level of pollutants in the outdoor air, develops and implements plans to meet future air quality initiatives, assures compliance with air quality rules, and educates, informs and assists the public with regard to air quality issues. This report focuses on non-regulatory, or voluntary, efforts to further reduce air pollution and improve air quality.

N.C. Air Awareness has been successful in implementing air quality outreach and education initiatives for more than two decades to many different audiences including schools, private businesses, communities, municipalities, and other organizations. Much of the work is done through partnerships with like-minded organizations, groups and businesses that are willing to spread our air awareness messages to help their communities or organizations. The program reaches thousands of citizens annually. The N.C. Awareness is grounded in cutting-edge air quality science and education techniques. For instance, educating about low-cost alternatives to help reduce air pollution and improve air quality.

To achieve the N.C. DAQ air quality goals, the N.C. Air Awareness program advocates voluntary actions such as relieving traffic congestion, reducing harmful tailpipe emissions, achieving and maintaining the national air quality standards, and reducing unnecessary vehicle idling. The N.C. Air Awareness program uses monitoring information, as well, to inform the public about air quality across the state. At the core of the program is the forecasting system, (www.ncair.org/airaware/forecast), which produces daily air quality forecasts based on the Air Quality Index values for ground-level ozone and particle matter. The cumulative impact of these and other actions, North Carolina air quality has improved over the past two decades.

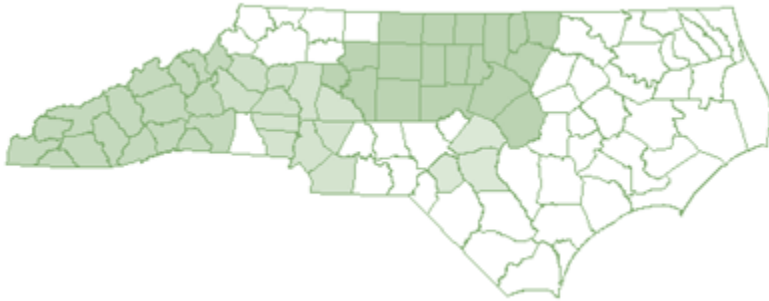
Significant progress has been made to improve air quality in North Carolina. However, important and challenging work remains today to maintain the current air quality standards, and to insure clean air. As areas in North Carolina continue to attain the National Ambient Air Quality Standards¹, the N.C. Air Awareness programs increases opportunities to maintain the improvements while engaging communities using science-based information.

¹ Federal air quality regulations mandated by the Environmental Protection Agency

OVERVIEW

Air pollution is a problem that affects all of us. The average adult breathes more than 3,000 gallons of air each day. Children, although smaller in size, breathe more air per pound of body weight than adults and are more sensitive to air pollution. Older adults and active adults can also be more sensitive to air pollution and may need additional information and protection from harmful air pollution. N.C. Air Awareness reaches all 100 counties in the state of North Carolina. Efforts are focused in key areas including major metropolitan zones, locations historically have air pollution issues, areas that are in maintenance for air pollutants, and locations with strategic partners.

This report focuses on providing highlights of the three main elements of the N.C. Air Awareness program: **education, community engagement, and partnerships**. While the program generally focuses 50% on education, 25% community engagement, and 25% partnerships, this reporting period was dramatically different because of COVID. Approximately 48 percent of the programs efforts focus on education, 10 percent on community engagement, and 43 percent on partnerships.



The program's overarching topics include driving behaviors; vehicle maintenance; transportation alternatives such as walking, biking, and transit; energy conservation and energy alternatives; and open burning.

The primary goals of the N.C. Air Awareness program are to:

- 1) Inform and provide information about air quality issues,
- 2) Provide tools to teachers and families so they can protect the health of students and their family members, and
- 3) Empower citizens to make behavioral changes now or in the future to reduce air pollution.

This annual report outlines N.C. DAQ's overall work to inform North Carolina citizens about air pollution and how to reduce their impact on air quality which can benefit the entire community. The reporting period is in line with the state fiscal year (SFY) 2019-2020 and covers July 1, 2019 through June 30, 2020.

CHALLENGES

The N.C. DAQ experienced several challenges in FFY 2019-2020 that impact the N.C. Air Awareness program; they include changes to staff, funding, and the coronavirus pandemic.

In May 2019 N.C. DAQ N.C. Air Awareness staff experienced staffing changes, losing two temporary employees who were instrumental in providing education and outreach to the communities in N.C. These staff were not replaced until the end of August 2019. The new staff were hired as temporary employees. In January 2020, one of the temporary staff was hired as a permanent employee. In April 2020, N.C. DAQ terminated the remaining temporary staff person because of funding constraints.

The N.C. Air Awareness program, including staff, is funded 80% by Congestion Mitigation and Air Quality Improvement (CMAQ) funds. In October 2019 N.C. DAQ began requesting CMAQ funds authorization from the N.C. Department of Transportation (DOT) and continued this request until March 2020. In March 2020, the N.C. DOT informed the N.C. DAQ that no additional CMAQ funding would be available for the remainder of 2020. The N.C. DAQ will pursue future CMAQ funding for 2021 and future years and began drafting project plans in September 2020. Additionally, other funding streams normally available to N.C. DAQ through fuel taxes and Motor Vehicle Emissions Inspection and Maintenance (I&M) program fees, were adversely impacted by the coronavirus pandemic.

On March 14, 2020, Governor Roy Cooper issued Executive Order 117 in response to the coronavirus (COVID) pandemic. In this order, mass gatherings of more than 100 people were banned, including parades, fairs and festivals; and K-12 schools were closed statewide. On March 27, 2020, Governor Cooper issued Executive Order 121 which directed all N.C. citizens to stay at home and limited gatherings to 10 people or less. This order also included many business closings. The N.C. DAQ acted accordingly and implemented teleworking for staff. In March, with the increased COVID cases across the state, K-12 schools remained closed and N.C. DAQ employees continued to telework. In August 2020, schools began reopening on a limited basis, most however continue to offer distance learning or virtual classroom instruction. The N.C. DAQ was still operating in a telework mode. This was an important change in the way in which the N.C. Air Awareness program operates. Many of the in-person events we attend and promote were cancelled and have not resumed.

EDUCATION



N.C. Air Awareness conducts many direct environmental education programs and projects which has N.C. DAQ staff, local coordinators, or partners working hand-in-hand with community groups. The local Air Awareness coordinators and N.C. DAQ staff venture to educate and inform the public through classroom presentations, afterschool programs, summer camps, science fairs, and other community events. By utilizing these, and other education channels, N.C. Air Awareness has directly worked with and reached thousands of kindergartens through 12th grades (K-12) and university students, teachers, parents and community leaders.

Many of the projects and lessons offered are adopted from proven environmental education curriculums, like the one developed by the Environmental Protection Agency (EPA), or developed by N.C. DAQ. All of N.C. Air Awareness education lessons and activities align to the N.C. Essential Standards so teachers can easily bring them into their classrooms. Some topics include:

- Driving Choices: Cars and Air Quality
- Electricity Efficiency and Air Quality
- Renewable Energy Technology and Air Quality
- Energy Efficiency
- Air Quality and Health
- Air and the States of Matter
- The Chemistry of Combustion

Elementary Education

Our statewide program conducts a variety of K-5 education programs throughout the year. N.C. DAQ frequently delivers a free air quality education curriculum for grades K-5 called *The Adventures of Clair and CAM*. (<http://ncair.org/airaware/edu/>) The curriculum is paired with the program's mascots, Clair, the Clean Air Explorer, and CAM, the Clean Air Maniac. Clair and CAM help teach children about the properties of air, the difference between ozone and particle pollution, the health effects of air pollution, and the benefits of carpooling and other alternative forms of transportation.



An additional focus area geared toward K-5 students is the voluntary "Turn Off Your Engine" program. The program works to distribute signs and materials to partners interested in reducing unnecessary idling in their parking lots and pick-up areas. Excessive and unnecessary vehicle idling is a serious, avoidable contributor to air pollution and poor human health. Excessive idling is widespread in all types of vehicles, including cars, buses and trucks. This behavior occurs throughout virtually all transportation activities, including parents picking up children after school, customers waiting in line at a drive-through, ATM or restaurant, not to mention trucks delivering goods and buses waiting to pick up passengers.

Other instructional lessons are utilized by N.C. DAQ to teach preschool, early elementary students, and multi-age programs at Libraries and Science Centers about the basics of air. Through magic tricks and air quality demonstrations the program "Magic or Science" helps young people, and perhaps their parents, to understand that magic tricks amaze them, just as inquiry and the scientific process and is a way to amaze students and learn. Of course, in magic, the truth behind the tricks is never shared unlike in science where the sharing of knowledge is key.

Keith Bamberger has been working with Evergreen Community Charter School in Asheville for over ten years. About a month after working with the fifth grade student and introducing molecules in the air as one part of the Electricity Matters lesson, Keith received a call from Marin Leroy, Environmental Education Specialist at Evergreen. She said, "Keith my student's won't stop talking about you. Or to be more specific they won't stop talking about your molecule kits." The N.C. Air Awareness team arranged for the school to borrow the molecule kits for a week. Keith was then invited back into the classroom by the students to do activities on cellular respiration and combustion.



Annie Lee and Melissa Kennedy ventured to Stories Creek Elementary School in Roxboro N.C. to teach K-3rd graders during their Science Technology Engineering Arts and Mathematics (STEAM) day. Working with 190 students Melissa and Annie taught about the properties of air, and how important those properties are so that scientists, and meteorologists can learn about air pollution. Instruction also included how air pollution forms, moves and interacts with weather and ways to improve the air quality. The kids were blown away trying to figure out if they were learning about science or if it was just magic. Magical experiences were had at Stories Creek Elementary.



Upon the onset of the pandemic the Air Awareness team has worked diligently to continue to support teacher partnerships and to continue conversations in that arena. During the past 8 months, the team has pivoted to being guest speakers at live Google Classroom presentations. The team has been fortunate to have in-house N.C. DAQ meteorologists present to 80 fifth graders on weather formation and forecasting.

Middle School Education

Local air awareness coordinators provide air quality-related education activities to hundreds of middle school students. Educational activities included Science, Technology, Engineering and Math education (STEM) focused lessons and engaging activities. Middle school students are already learning about layers of the atmosphere, properties of air and a variety of other physical and chemical concepts that can be made “real” to students through learning about their own air quality. Schools that engage in programming are able to have their curriculum supported in studying the properties of air using molecular models, asthma and its effects on the cardiovascular system, and even compare school bus and hybrid engine exhaust during a “Sock It” demonstration.



Discovery Charter School

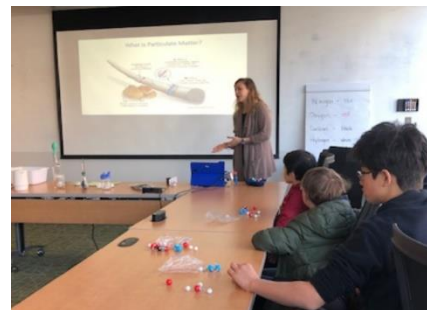
New this year N.C. Air Awareness added a personal air sensor loan program utilizing the Air Beam 2's. The program allows for entire classes of students to work in groups and collect real time air quality data for their immediate space. These sensors are for educational purposes only though do register particulate matter 2.5, relative humidity and temperature. Team members Annie and Jonathan were able to work with an educator at Discovery Charter School in Durham and place air sensors in the hands of 75 seventh and eighth grade students. After Annie instructed students about air quality and the sensors, the teacher, Mr. Bray, had his students develop their own methodologies for collecting data. These data were collected



from predetermined student chosen locations that were based on the hypothesis each group developed.



In March, the Air Awareness team had the pleasure of hosting the Moore Square Science Olympiad team at Green Square. Annie and Melissa worked with the Office of Environmental Education and held an educational demonstration and engaging manipulative session. In the session they discussed the properties of air, common air pollutants, and how pollutants form. They ended with actions that the students can take to reduce air pollution. The students were from the Moore Square Middle School and were 6-8th grade members of their Science Olympiad team. In addition to learning about properties of air, and air quality monitoring, the students learned about the Shad Release Program and Creek Watch with the Division of Water Resources.



2019 – 2020 AQ-IQ Contest

N.C. Air Awareness also develops its' own materials and competitions to engage middle school students. The AQ-IQ contest is an annual air quality contest for seventh graders to showcase their environmental knowledge and problem-solving abilities. For this year's competition the students could choose from a variety of categories to focus on. The topics were Transportation, Climate Change, Year of the Fire, Earth Day and the 50th Anniversary of Earth Day.

The students then took their topic of interest, researched it and developed their own ideas for solving that problem, or developed steps for moving forward. Then they presented their work through an artistic medium whether that be a poster, digital platform, art project or video.

This year the contest was hindered by COVID. The hinderance led to N.C. DAQ developing a new format for the competition that allows students to turn the projects in online, which will streamline the contest in the future and make participation easier for all the student across the state.

The common phrase is, “a picture is worth a thousand words.” That phrase falls far short of describing the 2019 – 2020 AQ-IQ Contest for Seventh Grade Students. The Margie Mears Best in State Award was won by Emma Leddy of Mills Park Middle School in Wake County. Ms. Leddy created a video with over 1,000 individual drawings to create the three-minute video on the positive effect of the industrial revolution, the negative effect on air quality, and solutions to improve our air.



Due to COVID even the Recognition Ceremony was pushed into the virtual world. You can read about all the winning projects, watch N.C. DAQ Director Mike Abraczinskas’ ceremony welcome, or even start getting your favorite seventh grade students involved in the 2020 – 2021 contest by

visiting: <http://web.eenorthcarolina.org/resource/about.aspx?s=121764.0.0.37430>

High School Education

It’s Our Air (IOA) is a free North Carolina specific curriculum² that includes a series of activities and videos focused on air quality developed for Earth and Environmental science teachers and educators to use with students. IOA is designed to help students develop a better understanding of the science and technology that helps to explain, monitor, predict, and protect air quality.



The curriculum consists of three modules: 1) Air Pollutants and Their Sources; 2) Predicting Air Pollution; and 3) Problems and Solutions. These modules contain 16 structured, hands-on classroom and field activities in which students use data analysis, experimentation, creativity, research, and mapping to understand air quality science and issues. Ten short videos are associated with specific concepts or activities with the goal of enhancing learning via animated illustration of scientific concepts, “virtual” field trips and

² See It’s Our Air at- itsourair.org

interviews with scientists. Videos feature an engaging host/teacher and a diverse group of N.C. high school students.

The *It's Our Air* high school curriculum was expanded into Mecklenburg and Forsyth counties in 2019-2020. We provided in-person teacher workshops in the Charlotte area in January 2020. Across the state we provided three full day workshops, with 33 attendees, and seven part-day workshops with 154 attendees. Due to COVID, in March 2020, the team quickly pivoted and created an online version of the in-person teacher workshop to address the needs of teachers during stay-at-home orders. Key staff from our partners in Mecklenburg and Forsyth counties participated in the both types of workshops. To date 17 teachers have participated in the online workshops, and 20 more are in process. We expect that this effort will continue in 2020-2021 due to the increase in online learning.

In light of the pandemic *It's Our Air* program now has resources with a more robust digital platform that is easier for educators to use and issue as assignments to their students during the pandemic.

The Driving Choices portion of the *It's Our Air* curriculum was presented to 20 driver's education high school classes at 5 different high schools in FFY 2019-2020, reaching over 700 students. All the high schools are in the Raleigh area. In these presentations we discussed driving choices, good driving habits, car maintenance, and environmental impacts of cars and trucks on air quality with high school driver's education classes. We showcase the fuel economy website³ to show students the differences in vehicles and how what they choose can make a difference in air quality. We also show them how to calculate their miles per gallon of fuel consumed as a good rule of thumb for car maintenance. We have established a partnership with key staff at the N.C. Department of Instruction and Jordan Driving School, who will be instrumental in (1) getting the relationship between cars and air quality inserted into the N.C. state-wide driver's education curriculum, and (2) distributing our messages, presentations, and virtual presence state-wide over the next few years.

During the 2019-2020 fiscal year the N.C. Air Awareness team added new learning opportunities on energy generation and how the energy sector impacts air quality. This new program utilizes Kid Wind air turbines and Vernier solar kits so educators and students can explore wind and solar energy technology as well as build their own renewable microgrid systems. Team member Annie Lee led students, educators and colleagues through the process of learning more about renewable energy technology, reliable energy grid systems and the future of transportation technology. She highlighted where the transportation sector can be powered by cleaner energy technologies which effects air quality.

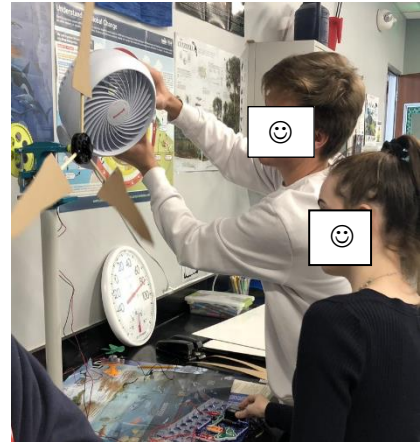
³ <https://fueleconomy.gov/>

Teacher Partnerships

Working collaboratively with teachers has yielded impressive results all across North Carolina; periodically we work with master teachers who want to enhance their focus on air and water quality issues. We also work with new teachers and help them start to introduce environmental issues into their classroom. It is always exciting to see how our support helps improve the quality of teaching and improve the understanding of students.

Annie Lee traveled to Research Triangle High School with Dana Haine from UNC-IE collaboration in instruction with Ms. Strada and Ms. Howington – both Earth and Environmental Science teachers. Annie provided instructional support in teaching the students on micro grid technology. Over the course of a couple of days, students designed and created their own wind turbine blades and complete a micro grid that utilized a variety of new energy technologies. Ms. Strada has been accepted into and is currently participating the in the UNC-IE Energy Literacy Fellowship.

Upon completion of the in-class exploration with microgrids Annie Lee was invited to join the students on a field trip to the Power Secure Microgrid. Super cool! The students were able to see how a microgrid is fabricated and assembled, and witnessed the microgrid being “islanded” from the main electrical grid.



A Taste of Education Outside the Classroom

Melissa Kennedy and Jonathan Navarro attended the N.C. Math/Science Education Network Pre-College Program, a STEM-enrichment program that recruits students from underserved populations in grades 6 through 12. This program includes over 200 participants and provides the students with experiences that will equip them to attend a four-year college/university to pursue majors in science, technology, engineering and mathematics (STEM) fields. Melissa’s presentation was on career development, a summary of who N.C. DEQ and N.C. DAQ are, what we do, and a hands-on activities about air quality (molecule kits) before talking about her own experience and advice for them.



TRAININGS AND WORKSHOPS

N.C. Air Awareness works to train future, influential, environmental educators as well as classroom teachers to ensure air quality is incorporated into activities at their schools, education centers, and museums. N.C. DAQ provides and supports unique outdoor and environmental education workshops for teachers as North Carolina is home to a network of diverse educators and landscapes.

The N.C. DAQ hosted many “Train-the-Trainer” style workshops throughout the state, and to ensure we know our material, N.C. DAQ staff members attend trainings as well. The *It’s Our Air* high school curriculum was expanded into Mecklenburg and Forsyth counties in 2019-2020. We provided in-person teacher workshops in the Charlotte area in January 2020. Across the state we provided three full day workshops, with 33 attendees, and seven part-day workshops with 154 attendees.



Advanced Ozone Air Quality Workshop - Purchase Knob, N.C.

The N.C. DAQ partnered with the Great Smoky Mountains National Park for the 2019 Ground Level Ozone: Advanced Air Quality workshop. Thirteen Educators gathered at Purchase Knob and Clingmans Dome to learn about the effects of air pollution on plants, animals and people.

This year, we had a mixture of young people who are getting into the field of environmental education, graduate students, professional educators, and at least one person, Gloria Lengle who had this workshop on her bucket list for a long time.

These educators then took this knowledge and disseminated it. Including tips on how to protect health; and ideas to reduce air pollution to their students and communities.



UNC- IE and Energy Literacy Teacher Fellowship

Beginning in October of 2019, we worked with the University of North Carolina's Institute for the Environment (UNC-IE) Energy Literacy Teacher Fellowship – led by Dana Haine, to help lead trainings on the Clean Energy Plan for secondary educators. These trainings included ways that the Clean Energy plan⁴ can be included and utilized as a resource for instruction. This training and the integration of these conversations began in September of 2019 and continued throughout the duration of the fiscal year. Through this training we formed strong relationships with

⁴ https://files.nc.gov/governor/documents/files/NC_Clean_Energy_Plan_OCT_2019_.pdf

educators across the entire state and helped support them as they navigated a new landscape of environmental topics. Through this space members of the N.C. Air Awareness team were invited to work in these classrooms as guest educators.

Online Professional Development - Introduction to Air Quality

In light of the pandemic, and the inability to hold in person workshops, Keith Bamberger has been influential in developing our teacher workshops now fully held online! Through the Office of Environmental Education, we are proud to be hosting an *Introduction to Air Quality* course that is available for all educators to earn professional development credits. This online course moves through the history of air quality and air quality legislation in North Carolina, transportation as a primary source of pollution, the different curriculum opportunities provided, and a live chat with an air quality specialist. The workshop also moves the educators through a variety of activities that enhance their own understanding, as well as activities that can translate directly into their classrooms. Since the course was launched over the summer 30 educators have completed their course work and earned their professional development credits.

Climate Change Education

In 2018 Governor Cooper signed Executive Order No. 80: North Carolina's Commitment to Address Climate Change and Transition to a Clean Energy Economy. Since the signing, the N.C. Air Awareness team has incorporated climate change education into the program given the relationship to air pollution.

The Air Awareness team is dedicated to ensuring that its members stay current on climate science, air quality and environmental education strategies. In February, Annie and Keith traveled to the Great Smokey Mountain Institute at Tremont to earn 18 hours of professional development attending the training entitled Climate Systems: Effective Communication About Climate, Air Quality and Energy.

During this training, team members were instructed by UNC - Asheville professor Douglas Miller, on mountain meteorology. Specifically changes in weather patterns as well as storm events and changes in wildfire behavior in the N.C. and T.N. mountains.

In addition, they got into the field and had a fun time analyzing local biosphere for information on air quality and organisms, like salamanders, that help to indicate health. A key component was diving into how energy moves and changes forms in mountain ecosystems and how these cycles are driven by climate. This opportunity also allowed team members to connect with Western N.C. educators and expand our network of partners and build a collaborative with other organizations and schools.

PARTNERS



Regional partnerships are vital to the N.C. DAQ's success. N.C. DAQ works closely with a variety of partners including local air awareness coordinators, councils of government, private companies, and many others. Partnerships continue to prove a valuable pathway for N.C. Air Awareness to accomplish many objectives with limited staff and resources. By building and leveraging partnerships the team can reach a much wider audience with its messages and programs. Furthermore, by utilizing local partners, N.C.

Air Awareness can more effectively communicate to a specific community or region because of the established relationships and trust that has been built over time. Partners gain access to materials, assistance with staging events, networking opportunities for their employees, and on-site help with environmental initiatives. The Asheville Regional Office Air Awareness program has been working closely with the Land of Sky Regional Council of Governments for over twenty years. For instance, the Clean Air Campaign is the education and outreach component of the Land of Sky Clean Vehicles Coalition. The Clean Air Campaign brings together business, agencies, and non-profits to coordinate efforts in education and outreach about clean air. Diverse partners are also a part of the Annual Air Quality Update Press Conference. The press conference combines regulatory updates with industry updates about how to keep the air clean specifically for citizens in and around the Asheville, N.C. area.

The fall of 2020 was a busy time for the N.C. Air Awareness team! We attended several partner events some were particularly memorable. In our partnership with Museum of Natural Sciences we attended their SciREN event again this year. It is a time for educators to come and explore science education opportunities, spark their curiosity, speak with local scientists, and preview exhibits at the museum. At this event we reached out to educators and informed them of our curriculum opportunities, *It's Our Air, Clair and Cam*, the AQ-IQ competition and to showcase our new personal air sensor loan program. This event was particularly successful because we were able to partner with a couple of teachers to work with them with the personal air sensors program.



In November members of the Air Awareness team attended Clean Air Carolina's State of the Climate. This event included representation from the Forsyth Regional Office, Tom Hillis. Recognition was given to statewide efforts within Clean Air Carolina for the projects and productive education efforts.

As part of the Ozone Garden project, Melissa Kennedy partnered with Duke Gardens⁵ and JC Raulston Arboretum⁶. She helped the in-house educators at both gardens identify plants potentially sensitive to air pollution and provided them signage. The signs provided information about the relationship between air pollution and plant damage so that people enjoying the gardens could learn. The educators at the gardens were also given activities for kid camps surrounding these plants. The signs also provided visitors with ways in which they could reduce air pollution from their cars and homes.

In April, the N.C. Air Awareness team successfully collaborated with partners in Mecklenburg and Forsyth counties during Earth Month and Air Quality Awareness week. In March, COVID interrupted all our in-person events we quickly pivoted our outreach to online sources. We partnered with other N.C. DEQ divisions like Water Resources and the Office of Environmental Education. We all posted on our blog (Environmentally Speaking⁷), Facebook site and Twitter feeds about the history of Earth Day, the history of the N.C. DAQ, the N.C. Air Awareness program, AQ-IQ videos, Helpful Tips, and much more. All our posts and tweets were re-shared by our partners for the whole month of April. We, in-kind, re-shared all the information provided by our partners. We shared our posts with sister agencies in Southeastern states and with the Association of Air Pollution Control Agencies (AAPCA). Without continued collaboration with partners both inside and outside of N.C. DEQ our efforts to reach and support the public during the pandemic could have been a struggle, instead we have built stronger ties and closer relationships.

The insurance group Blue Cross Blue Shield of North Carolina hosted a virtual lunch and learn on air quality and its impacts on human health. At this virtual event N.C. Air Awareness team member Annie Lee presented on air quality, how poor air quality impacts human health of all ages as well as behavior changes that can be made to improve the quality of the air that we breathe. Both groups, Blue Cross Blue Shield of N.C. and the N.C. Air Awareness team were excited to see 80 individuals in attendance for this virtual event.

COMMUNITY ENGAGEMENT



Air quality affects everyone in a community and there is a communal responsibility to help keep our air clean and healthy for all. Due to this reality N.C. Air Awareness provides outreach to citizens and their communities, by maintaining an active presence in six metropolitan regions⁸. Through community engagement programs, N.C. DAQ works to provide an open forum for discussion with the public, whom might not be otherwise exposed to air quality information in North Carolina.

The public engagement information aimed at all citizens focuses on the science of air quality, effects on health, air quality forecasts, a variety of other education programs. Community programs include but are not limited to: ozone forecast season events, local and community events and festivals, regional and state fairs, online efforts, mass media and Enviroflash.

⁵ <https://gardens.duke.edu/>

⁶ <https://jcra.ncsu.edu/>

⁷ <https://deq.nc.gov/blog/2020-04-01/history-division-air-quality>

⁸ Charlotte, the Triangle, the Triad, Asheville, Hickory, and Fayetteville

Participating in these communal events reaches larger audiences and establishes widespread understanding of air quality issues. Additionally, interacting with the public at outreach events has enabled local air awareness coordinators to find new partnerships with organizations or businesses that have similar goals.

The N.C. DAQ provides resources and materials, helps in planning, and supports the regional activities, which allows us to provide air quality education at multiple events. While the pandemic interrupted many of our planned events this year, we were still able to get out and about and spread the work about air quality in N.C.

Air Avenger Sightings



What's faster than a speeding bullet, more powerful than a locomotive, and able to speed by waving children during a parade? The Air Avenger! The Air Avenger was once again seen during the fall of 2019. He was seen at the Annual Fall Festival Parade the Cherokee Nation accompanied by the Tribes' Chevy Volt and a Tesla. Then less than a month later he was seen in Asheville and Waynesville asking everyone to be "Good to the Air" and showing "Cleaner Cars for a Cleaner Future!"

Out and About

In February Melissa spent a chilly afternoon out at Falls Lake at Blue Jay Point County Park for their Winter Open House. The theme of it event was "It Takes a Village", our table included some activities about properties of air. Melissa showcased our "Sock It to Me" socks – our socks have been placed on a variety of tailpipes to catch the exhaust from diesel school buses, gasoline buses and passenger vehicles. This activity very clearly shows the impacts individual vehicles have on air quality because the socks get very dirty and smelly. This event included a flip chart of behaviors (like walking, riding a bike, turning off lights, buying certain vehicles) where people could put a sticky note next to the ways they thought they could help improve air quality.



LOOKING FORWARD

It is our vision to continue a robust variety of successful N.C. Air Awareness projects. Overall, N.C. Air Awareness focuses in three overarching categories: Education, Community, and Partnerships. N.C. Air Awareness overarching topics include driving behaviors; vehicle maintenance; transportation alternatives such as walking, biking, and transit; energy conservation and energy alternatives; and open burning. In the future N.C. DAQ will continue its education and community engagement projects capitalizing on established relationships and partnerships.

Additionally, N.C. DAQ is pursuing ways in which we can continue to support the EPA Advance Program for both ozone and PM2.5. The EPA Advance Program encourages collaborations between state, local and community organizations to encourage ozone and PM2.5 emissions reduction. The program is specifically for areas that are currently in attainment of the ozone and PM2.5 National Ambient Air Quality Standards (NAAQS). The program provides a flexible framework for organizations who want closer involvement and support from EPA.

Education Projects

The backbone of the N.C. Air Awareness program is the education projects and space for teacher collaboration we provide. Through the education program, N.C. Air Awareness seeks to provide science-based air quality information and health effects to educators and students so that they can have a better understanding of air quality. We focus on in-classroom activities, virtual and distance learning, webinars, science, and summer camps, after school programs, and teacher workshops. We enhance our air awareness curricula by including science, technology, engineering, and mathematics (STEM) activities in English and Spanish especially for K-5 grades.

Workshops will be held virtually or in-person for educators in western North Carolina, the greater Mecklenburg region, Triad region and Triangle region. We will continue to focus on our Education projects; namely Vehicle Emission Reduction Activities (VERA), Air Quality Champion Recognition, and Distance Learning, while being ready to pivot quickly should opportunities and resources lend to expanding.

Our education projects have now expanded to include distance learning opportunities. The *It's Our Air* curriculum now has a virtual engagement component and contains resources that are easier for teachers to launch directly into their classrooms, quickly integrate them into their lessons and receive graded feedback.

In addition our educator workshops have expanded virtually, and these professional development opportunities can be completed online for individual professional development credits for both formal and non-formal educators. This *Introduction to Air Quality* workshop is offered through the Office of Environmental Education. The workshop is self-paced, and holistic in nature as it walks educators through the basics of air quality science, air quality issues (including transportation and the evolving energy sector) within the state of North Carolina, and solutions to these issues.

VERA is also being launched online and in conjunction with North Carolina's Department of Public Instruction's driver's education course so that the lessons on vehicle emissions can be brought to every driver's education classroom. These lessons emphasize the importance of creating efficient driving habits as well as vehicle choice and the improvements in electric vehicle technology so that students are better equipped to make informed decisions that directly impact transportation and its effects on air quality.

Presently, an energy curriculum specifically for middle school is being developed. The curriculum works through the fundamentals of electricity generation and how its generation impacts the environment, specifically air quality. This project is focusing in on micro-grid technology and the ways in which the transportation sector is evolving. These intriguing developments are key in teaching future generations about improving environmental health and air quality. This curriculum ties in directly with the North Carolina Essential Standards and includes the environmental concerns as well as the technological advances taking place, it is STEM-based and aids in the development of skills in both critical thinking and creativity.