



Opinion

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Educating the Public about Air Pollution and Plants: Experiences at the Air Quality Learning and Demonstration Center at Penn State University (2003-2019)



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Abstract

The Air Quality Learning and Demonstration Center (the Learning Center) was located within the Arboretum at the Penn State University campus in University Park, PA (USA). It was in operation from 2003 to 2019 and was a unique outdoor educational facility used to heighten public awareness of the importance of clean air (with a primary emphasis on plants) and provide current information on air quality problems, issues, and integrative solutions. The Learning Center was designed to provide a hands-on experiential educational experience with garden demonstrations of sensitive plants, controlled air exposure of plants using open top chambers, an outdoor learning pavilion for lectures and discussions, and a Pennsylvania Department of Environmental Protection (PA DEP), Bureau of Air Quality (BAQ) Monitoring Station that provided real time air quality and meteorological data. Thousands of students and members of the public visited the Learning Center during the 17 years of its existence. In addition, several students completed graduate and undergraduate theses using the resources of this facility and numerous other students had extensive research and teaching experiences working at the Learning Center. During its life, the Learning Center experienced annual external funding fluctuations and the educational and research programming was adjusted accordingly. The Learning Center was closed in the Fall of 2019 when external funds were no longer available, and the facility was completely dismantled (except for the BAQ Monitoring Station) during the summer of 2020.

Keywords: Air pollution; Education; Environment; Funding

Abbreviations: The Learning Center: The Air Quality Learning and Demonstration Center; PA DEP: Pennsylvania Department of Environmental Protection; BAQ: Bureau of Air Quality; EPA: The US Environmental Protection Agency; K - 12: kindergarten to 12th grade in US schools

Introduction

The Air Quality Learning and Demonstration Center (the Learning Center) at Penn State University, University Park, PA (USA) was established during the spring and summer 2003 through the efforts of Dr. John Skelly (Professor of Plant Pathology) who raised most of the funds needed for the design and initial infrastructure development [1]. Penn State University provided the land for the Learning Center and some financial resources (such as partial salary for the principal investigator, temporary labor, and some material costs) but did not provide monetary support for subsequent programming and maintenance needs. Upon Dr. Skelly's retirement in 2004, Dr. Dennis Decoteau (Professor of Horticulture and Plant Ecosystem Health) assumed leadership of the Learning Center until its closing in 2019.

The Learning Center was the perfect outdoor laboratory devoted to air quality issues as it was situated downwind from air pollution sources located in the geographic area in the US that stretched from Chicago across the Ohio River Valley and into western Pennsylvania [2]. The programs at the Learning Center were hands-on, user-friendly experiences designed to impact future behavior and decision-making [3]. Lectures, field days, conferences, and general discussions were often held within the open-sided teaching pavilion. Interpretive signage educated visitors about the sources of air pollutants, and the specially designed gardens and landscape plantings at the Learning Center (including a bioindicator garden) were used as outdoor learning labs where air pollution-sensitive plants were grown that often

exhibited ozone-induced leaf injury by late summer and fall. Open top chambers filtered out ambient air pollutants (primarily ozone) to demonstrate plant how plants would look when grown in “clean air” that was relatively free of normal levels of the tropospheric air pollutant ozone. A PA DEP, BAQ Monitoring Station at the Learning Center provided real time air quality and meteorological data [4].

Conclusion

During the span of the 17 years of its existence, the resources of the Learning Center were used to successfully host educational programs directed at a variety of interested clientele including K-12 students, public school teachers, college students, retired residents, and other environmental and educational professionals [5]. Thousands of students and members of the public visited this one-of-a-kind outdoor learning facility (solely devoted to air quality education). The Learning Center was recognized for its uniqueness and effectiveness in 2007 with an Innovation Award from Penn State’s College of Agricultural Sciences’ Environment and Natural Resources Institute [6]. Timely publications were developed [7,8] and regular updates on the activities of the Learning Center were reported at numerous national [1,4,6,9,10] and international [11] meetings. Besides university classes, various regional and local meetings were held at its location including a US Department of Agriculture Meeting in 2010 on “Characterizations and Mechanisms of Plant Responses to Ozone” and an Osher Lifelong Learning Institute course (designed primarily for retirees) in 2011 on “Air Pollution Effects on our Ecosystem”. In addition, several graduate students [12-14] and an undergraduate honors student [15] utilized the resources of the Learning Center in their theses research. Numerous other students had extensive research and/or teaching experiences working at the Learning Center.

The Learning Center’s viability was strongly influenced by annual grant support that was subject to various internal (management) and external (political) factors [12]. Regardless, we continued to provide research and outreach to the public on a wide variety of topics of interest and useful information to support the mission of our primary granting agency (PA DEP) [6]. We also developed an Ozone Teaching Module [7,16] that was available for free distribution and leveraged additional teaching resources with an US EPA (Region III) Environmental Education Grant on “Enhancing Teacher Knowledge of Air Pollution Effects on Plants”.

The primary external financial support from PA DEP, BAQ that was essential for the Learning Center’s upkeep and maintenance was terminated in 2019. While we were able to handle funding fluctuations through the years, we decided to cease operations of the Learning Center when adequate operating funds were no longer available. As a result, the Learning Center closed in the fall of 2019 and the facility was dismantled during the summer of 2020. The BAQ Monitoring Station continues to exist at the location and is managed by PA DEP.

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Conflict of Interest

The authors report no conflict of interest.

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