

Editorial on Emergence of Air Pollution Science, Engineering, and Technology

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Environmental science and engineering are young professions compared to many other disciplines in the physical and natural sciences and engineering. In a span of just a few decades, advances and new environmental applications of science, engineering, and their associated technologies have coalesced into a whole new way to see the world. Science is the explanation of the physical world, while engineering encompasses applications of science to achieve results. Thus, what we have learned about the environment by trial and error has incrementally grown into what is now standard practice of environmental science and engineering. This heuristically attained knowledge has come at a great cost in terms of the loss of lives and diseases associated with mistakes, poor decisions (at least in retrospect), and the lack of appreciation of environmental effects.

Environmental awareness is certainly more “mainstream” and less a polarizing issue than it was in the 1970s, when key legislation reflected the new environmental ethos. The number of laws intended to protect natural resources, including air quality, grew steadily throughout the 20th century. Following the 1960s, the growth of such legislation grew exponentially with increased public awareness and concern. Notably, the 1970 Clean Air Act codified the national need to decrease air pollution by requiring federal standards for ambient air quality. This was accomplished by requiring state and local jurisdictions to implement plans to achieve air quality standards and to require sources of air pollution to decrease emissions. There has been a steady march of advances in environmental science and engineering for several decades, as evidenced by the increasing number of Ph.D. dissertations and credible scientific journal articles addressing a myriad of environmental issues. Corporations and government agencies, even those whose missions are not considered to be “environmental”, have established environmental programs.

Arguably, a more complete understanding of atmospheric processes is one of the more emergent areas of environmental science and technology; growing from the increasing awareness of air pollution and advances of control technologies in the twentieth century. However, the roots of the science of air pollution can be traced to the Ancients.

The environmental sciences, including its subdisciplines specializing in air pollution, apply the fundamentals of chemistry, physics, and biology, and their derivative sciences such as meteorology, to understand these abiotic and biotic relationships. Expanding these observations to begin to control outcomes is the province of environmental engineering.

As scientists often do, systematic and specific explanations must be applied to practical knowledge. So, biologists and their subdisciplines began to specialize in what came to be known as the environmental sciences. Health scientists, like Paracelsus and William Harvey, provided insights into how the human body interacts with and reacts to environmental stimuli. In fact, Paracelsus' studies of metal contamination and exposure to miners may well be among the earliest examples of environmental epidemiology.

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