



Environmental health needs a new paradigm, I. getting back in focus

Tee L. Guidotti

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EDITORIAL

Environmental health needs a new paradigm, I. getting back in focus

Environmental health is where public health began, in the middle of the nineteenth century in Europe. The core model of environmental health, what distinguishes it, has been the “source-exposure-receptor model,” which underlies almost all environmental and occupational health analysis.¹ It has been extraordinarily powerful in problem solving,² and represents the single most powerful strategy for intervention in public health. However, that is neither obvious nor attractive to many people inside and outside of public health practice and teaching who came to population health sciences through community-oriented health management, population health management in healthcare, clinical preventive medicine, and health promotion. These fields arose at least in part as a reaction to the “single pathogen, magic bullet” paradigm of infectious disease medicine, and asserted an alternative in the biopsychosocial-behavioral model of determinants of health.³ The quandary now is that these broader system models lack the technical resolution that is essential for evaluating and conceptualizing solutions to environmental health problems. Our future progress in academic and professional environmental health depends, in my opinion, on recognizing the strengths and the limitations of the source-exposure-receptor model, expanding on it to more complicated systems approaches to environmental problems (such as climate change ecosystem change) and putting environmental health in a broader social context without losing focus on the model.

The time has come for a rethink of what we are doing and a reframing of classical environmental health beyond the source-exposure-receptor model to place it inside a contextual framework that can accommodate issues of social determinants of health and collective behavior without losing the “hard edge” of technical analysis that has made it so successful in solving problems. This editorial will address the understanding of environmental health and its relationship to other health fields, which tends to go in and out of focus depending on the issues of the day and the public attitudes toward collective action. Our editorial in the next issue will address the need for an expanded paradigm that embraces sociobehavioral studies, not as a substitute for its chemical-biological-physical core but to *contextualize* environmental health issues, which the field cannot do by itself and which must be interdisciplinary.^{2,3}

To those of us who were trained in traditional schools of public health and have spent our careers dedicated to environmental health, the meaning of “environmental health” has always been quite clear. We were taught environmental health as a series of interlinked technical problems that shared elements of science, a common logic (the source-exposure-receptor model), a common three-pronged strategy for solution (remove or contain the agent, interrupt exposure, protect the host receptor), a fairly straightforward management, and an evaluation structure that had to address one big problem (how does one count incident cases that *do not occur*, and thereby demonstrate effectiveness). For most of the last century, that was enough. Now it is not.

We are now faced with different perceptions of the environment and of health.⁴ To our students, scientific peers, and activists primarily concerned with environmental studies and sciences, “environmental health” often means “the health of the environment.”⁵ To environmental studies scholars steeped in “deep ecology” and its successor schools of thought (philosophical exploration giving primacy to the natural world), human health is a peripheral, not a central problem in environmental management. However, the interdisciplinary field of environmental studies (not to be confused with environmental sciences) is primarily about context: the social, economic, cultural, political, and philosophical dimensions of the natural environment, the artificial environment, and the relationship between us and an environment that might be better off without us. Environmental sciences (not to be confused with environmental studies) is a field one step closer to environmental health and more familiar in that it is grounded in the physico-chemical nature of ecosystems and how human beings perturb them. The academic field of environmental health (less so occupational health) has much to learn from these approaches because they better define the context of how environmental health problems arise, what is driving the development of these problems, and how collective solutions may be conceived and implemented in a complicated ecological and social reality.

Academic departments of environmental studies and sciences could also be a substantial talent pool from which to draw future environmental health professionals who are equipped to understand *why* environmental condition are as they are, but at present the connection is loose. In academic environmental studies and sciences

(and sustainability studies, which is not as well developed), attention to health is largely limited to case studies in which health issues are studied primarily for their environmental justice implications. Health is not taught in these programs because these students are not expected to be health professionals. Health issues are also regarded by many environmental studies faculty as intimidating and too difficult to teach. This is understandable because human health studies are difficult and the professional and social consequences of doing or presenting them incorrectly are high. This is why the need is for collaboration with environmental health professionals rather than expecting environmental studies and sciences faculty to do it themselves. There is an opportunity for valuable cooperation here, clarifying why environmental health problems that we struggle with exist in the first place and why they are tolerated.

There is also confusion over which topics are in and which are outside the domain of “environmental health,” at least in academe. The emphasis in public health training shifted in the 1960’s and 1970’s from its grounding in microbiology, chemistry, and statistics to include social and behavioral sciences, influenced in large part by the emergence of health care organization as an academic field and even more by health promotion, which revitalized prevention science. This was extraordinarily productive in many ways but it never went all the way to a satisfactory integration of sociobehavioral and physical sciences. It has also led to some misconceptions. As an academic, I have been told numerous times by health promotion colleagues that environmental health as a field is deficient because it does not have a theory of health-related *behavior*. I have patiently explained that when the problem is clean water or clean air, changing individual behavior is not the answer. It is not even desirable, in most cases. In fact, relying on individual behavior should be the *last* resort for environmental health protection, to be avoided if at all possible. (A prominent epidemiologist once compared public health to preventive medicine by contrasting the efficiency, effectiveness, and cost of community water treatment to that of every individual boiling a pot of water every time it was needed in order to prevent typhoid.)

Environmental health is about reducing the scope of individual behavior, not modifying it or changing lifestyle. Individual behavior certainly has a role in environmental health when it comes to personal protection in occupational health, compliance by food handlers, handwashing by healthcare workers, and vaccination against polio (an environmental disease, lest we forget), but mostly we try to *engineer out* individual choice, discretion, and motivation, so that protection is as reliable and automatic as it can be. The central problem for behavioral science in environmental health is to motivate response on a community or national level to achieve effective policies, near-universal compliance, and support for funding structural (as opposed to behavioral) public

health interventions. It is not to motivate individual behavioral change to deal with common-source exposures affecting a community; this is a secondary consideration.

The primary role of behavioral studies in environmental health, therefore, should be to motivate collective action and structural intervention, such as support for technological changes, sustainable development, regulation, and safe infrastructure. The US Surgeon-General model of health promotion (prescriptive, outcomes oriented) tends to ignore the (collective, not individual) behavioral aspect of the public health strategy for environmental health while the WHO model of health promotion does acknowledge it by incorporating healthy public policy and advocacy (this is a key component of the Ottawa Charter).² However, its practitioners sometimes forget that environmental health problems are better solved by public support for technical solutions, not individual behavior change. The theory of behavior behind environmental health is therefore simply this: whenever possible, act in concert to support structural change for the elimination of risk by eliminating hazards or exposure and do not rely on fallible human judgment if it can be avoided. When one must rely on human behavior, shape it with as little discretion as possible to achieve consistency and reliability.

Another factor contributing to lack of clarity is appreciation for the scope of practice of environmental health. Twice I have worked under deans of public health who seemed convinced that infectious disease problems properly belonged to epidemiology and chemical hazards belonged to environmental health, and directed visitors, invitations, and opportunities accordingly. Given that historically the most pressing environmental health management problem globally has been microbial contamination of water, and that acute (but more often chronic) disease epidemiology is essential to investigating outbreaks due to microbial contamination and toxic exposures and is practiced by environmental health scientists, this was hardly a useful way to divide the public health universe. At the same time, the rise of “ecosystem health” issues (primarily climate change) as proper areas of study in environmental health caught many of our colleagues by surprise and outside of a few leadership institutions public health education still seems slow to incorporate ecosystem health into the public health curriculum, even for much-needed attention to climate change.

Anecdotally, my colleagues and I have noticed a fall-off in interest in and appreciation for environmental health. Environmental health education and training seems to be missing out on the large expansion in public health education of the last two decades, at least in North America. This has perpetuated the persistently low enrollment in environmental health programs compared to other departments and concentrations in schools of public health, although this is also partly explained by

the technical difficulty of the science-based curriculum in environmental health, compared to the more accessible socio-behavioral or management emphasis of most other departments (aside from epidemiology). Many incoming MPH students also do not seem to have a firm grasp of chemistry and biology, even in environmental health. When I was a full-time professor and department chair, we often had to teach the basics of chemistry (especially before our students took toxicology).

Given a lack of clear definition, it is not surprising that environmental health has been “recreated” at various times and in various ways by scholars and professionals who do not see it as a whole. “Medical geography” and more recently “medical geology” (perhaps better called “public health and geosciences”)^{6,7} grounded their views of health determinants on spatial analysis, somewhat oblivious to time-and-space analysis integral to epidemiology. Twenty years ago, there was a movement to define “ecosystem health” as a single concept of planetary well-being; this petered out over time. “One Health,” the enormously useful and demonstrably true concept that the health of human beings and at least animals is as one,² is trying as a movement to decide whether to stop there or to embrace the entire ecosystem (reminiscent of the “Gaia hypothesis” of a healthy planet). The quandary for One Health is to avoid becoming a “theory of everything” that is so all-embracing that it cannot deliver practical solutions.

Different points of view are good when they challenge the existing assumptions but not so good when they fragment effort or when the new paradigm is actually less complete or compelling than the old one. We saw this play out 30 years ago when the new field of health promotion (in its American version) transformed health education and behavioral science but had nothing meaningful to say about environmental health protection. That is because the American version of health promotion, as articulated by the US Surgeon-General’s office and consistent with the small-l liberal underpinnings of the society, became all about individual behavior and personal lifestyle choices. In the rest of the world, the concept of health promotion embraced healthy public

policy and collective behavior to achieve health protection on a community basis, supporting clean water and air and community safety initiatives. This is the inherent risk of a “theory of everything”: subsuming established and technically dense fields such as environmental health into a bigger, looser framework erases important distinctions and they lose effectiveness in practical application.

There are two responses to this tendency to subsume environmental health in the bigger picture. One is to push back and defend the boundaries of the field, which is the traditional academic response. This is both futile and short-sighted, because environmental health *does* need to change and to become more inclusive. The second, and the one I espouse, is to preserve the core of the field intact but to contextualize it so that its strengths can be appreciated and better leveraged. The second editorial in this series will address the latter approach.

—Tee L. Guidotti,
Editor in Chief

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