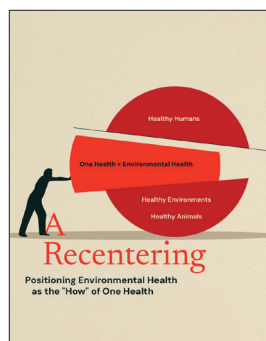


► GUEST COMMENTARY



Environmental Health: Delivering One Health Before One Health Was Fashionable

Abstract Positioning environmental health at the center of the One Health model corrects a longstanding misinterpretation of its role. Although One Health emphasizes human, animal, and environmental domains, environmental health is the integrative practice that operationalizes these connections and translates the paradigm into action. Recognizing this reframing underscores the urgent need to invest in the environmental health workforce to ensure One Health is not merely aspirational. Environmental health professionals are uniquely trained to manage risks at the human–animal–environment interface through regulation, surveillance, and prevention. Explicitly recognizing and strengthening this workforce is essential for delivering the practical promises of One Health.

Keywords: One Health, environmental health, human health, animal health, zoonoses

Introduction

One Health is described as an integrated and unifying approach that aims to “sustainably balance and optimize the health of people, animals, and ecosystems” by recognizing the interconnectedness of the health of “humans, domestic and wild animals, plants, and the wider environment (including ecosystems)” (World Health Organization [WHO], n.d.-b). It has gained prominence over the past two decades in response to pressing challenges such as zoonotic spillover (Sánchez et al., 2021); antimicrobial resistance (Velazquez-Meza et al., 2022); climate change (Magnano San Lio et al., 2023; Zhang et al., 2022); and the globalization of emerging infectious diseases (Deiana et al., 2024; Horefti, 2023), with various sectors of the global community—including gov-

ernment, public, and private institutions—embracing the One Health approach.

As shown in Figure 1, the initial foundation of One Health encompassed three overlapping domains—human health, animal health, and environmental health—that worked together to promote well-being across systems. In recent years, however, several interpretations of the One Health approach have emerged, with no universally agreed-on definitions of the concept’s central aspects. For example, the environmental component of the One Health approach might also be characterized as “environmental health” and might often be used interchangeably with “ecological health” to describe the state of ecosystems, biodiversity, and climate systems (Lerner & Berg, 2017). As Lerner and Berg (2017) highlight, the definitions and central

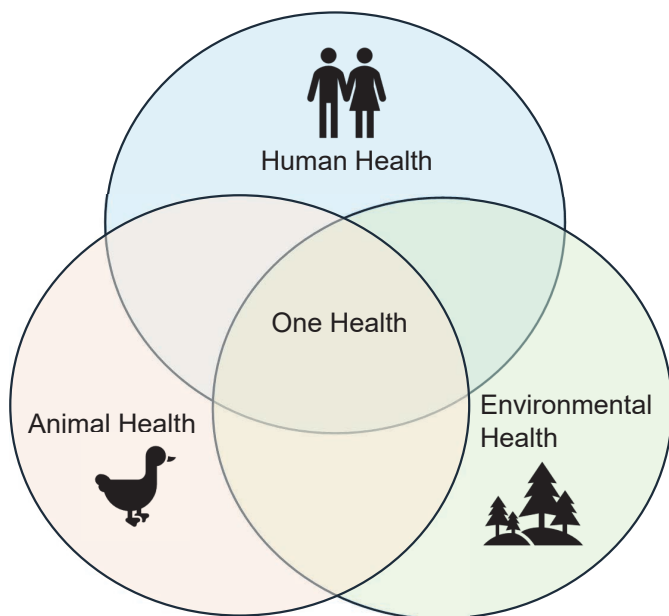
- Harriet Whiley, PhD
Kirstin Ross, PhD
*College of Science and Engineering,
Flinders University*
- Helen Psarras
*Australian Government Department of
Health, Disability, and Ageing*
- Gayle Davis, PhD
Henry Dawson, PhD
*Centre for Health, Immunology,
Microbiology, and Environment, Cardiff
Metropolitan University*
- Louise Dunn, MPH, PhD
*Education Innovation Exchange,
Swinburne University of Technology*
- David T. Dyjack, DrPH, CIH
*National Environmental
Health Association*
- Toni Hannelly, DrPH
*School of Population Health,
Curtin University*
- Zena Lynch, PhD
*School of Geography, Earth, and
Environmental Sciences,
University of Birmingham*
- Graeme Mitchell, MA
Liverpool John Moores University
- Matilde A. Rodrigues, PhD
*RISE-Health, Center for Translational
Health and Medical Biotechnology
Research (TBIO), ESS,
Polytechnic of Porto*
- Farah Ayuni Shafie, PhD
*Centre for Environmental Health and
Safety, Universiti Teknologi MARA*
- Lindsay Shaw, MSc
*Belfast School of Architecture and the
Built Environment, Ulster University*

aspects adopted for One Health often are influenced by different professional foci, personal background and experiences, or reflect the aims of the organization proposing it.

This article contends that environmental health, as a professional discipline, is frequently misinterpreted, overlooked, and undervalued—and that it is a vital contributor to the aims of One Health regardless of the central concepts or definitions of the One Health approach adopted by various sectors of the community. We further con-

FIGURE 1

The Traditional One Health Model



Note. Example adapted from <https://medschool.duke.edu/news/understanding-how-climate-change-impacts-human-health>.

A Summary of What Environmental Health Does

- Monitors and detects environmental hazards across water, air, soil, food, and housing systems.
- Assesses and prevents health risks from sanitation, waste, pests, vectors, and environmental exposures.
- Regulates, enforces, and educates to protect public health through environmental health legislation.
- Supports climate adaptation by reducing exposure to heat, flooding, and climate-sensitive disease risks.
- Delivers place-based, transdisciplinary action that operationalizes One Health at community and systems levels.

tend that One Health essentially is a reframing of environmental health, a long-standing discipline focused on managing the determinants of health at the human–animal–environment interface.

For more than a century, environmental health has delivered interventions that are central to the One Health approach at the human–animal–environment interface. This interface includes vector control; safe water and sanitation; food safety regulation; safe housing; waste management; and risk assessment of chemical, biological, and physical hazards (Whiley et al., 2019; WHO, n.d.-a). The sidebar provides an overview of some of the activities environmental health has always covered that are now being reimaged or reframed as One Health.

We present the traditional One Health model (Figure 1) and the One Health model as proposed by the authors (Figure 2). By placing environmental health at the center of the One Health model, we aim to correct this conceptual confusion and highlight that One Health is not a novel paradigm. Rather, it is a reframing of work that environmental health has always done. The novelty lies not in the

practice itself, but in the language now used to describe it.

Environmental Health: The “How” of One Health

One Health is an approach for addressing 21st-century challenges. It has been argued, however, that One Health has remained largely conceptual, hindered by its breadth and the lack of a clear pathway for operationalization (Destoumieux-Garzón et al., 2018; Häsler et al., 2012; Lee & Brumme, 2013). Thus, the model functions as a theoretical aspiration rather than a practical framework embedded in health thinking (Yopa et al., 2023).

By recognizing environmental health as the center of One Health, we identify the discipline that delivers the paradigm in practice. Environmental health professionals already manage the everyday determinants at the human–animal–environment interface: they regulate water quality, prevent foodborne and zoonotic disease, oversee waste and sanitation, mitigate environmental and occupational hazards, and contribute to the design of built environments that promote health. These activities exemplify

the “how” of One Health interventions that simultaneously protect human, animal, and ecological well-being. In this sense, environmental health is not an adjunct to One Health; it is the discipline that operationalizes it on the ground.

Reframing environmental health as central to the One Health approach transforms One Health from a broad conceptual vision into a practical, actionable framework. Rather than asking how One Health can be implemented, we can point to environmental health discipline as evidence that it is already being delivered. This shift not only grounds the paradigm in existing practice but also provides a professional identity and workforce by which One Health can be advanced.

It can be argued that the environmental health discipline already delivers integrated interventions that exemplify the One Health paradigm. For example, food safety regulation operates across animal production, environmental sanitation, and human health protection via inspection of meat processing facilities, cold-chain monitoring, hygienic processing controls, and outbreak traceability systems that prevent zoonotic transmission of pathogens such as *Salmonella*, *Campylobacter*, and *Listeria*.

Similarly, drinking water and wastewater surveillance programs routinely integrate environmental monitoring, infrastructure

engineering, microbial risk assessment, and population health protection, including the detection of emerging contaminants and infectious threats through environmental sampling and regulatory enforcement. Vector control programs further demonstrate this integration by combining ecological surveillance, land-use management, climate adaptation strategies, and community risk reduction to prevent vectorborne disease transmission. These routine regulatory and preventive functions simultaneously protect human health, reduce the risk of animal disease, and preserve environmental systems, illustrating that environmental health operationalizes One Health daily through applied governance rather than conceptual coordination alone.

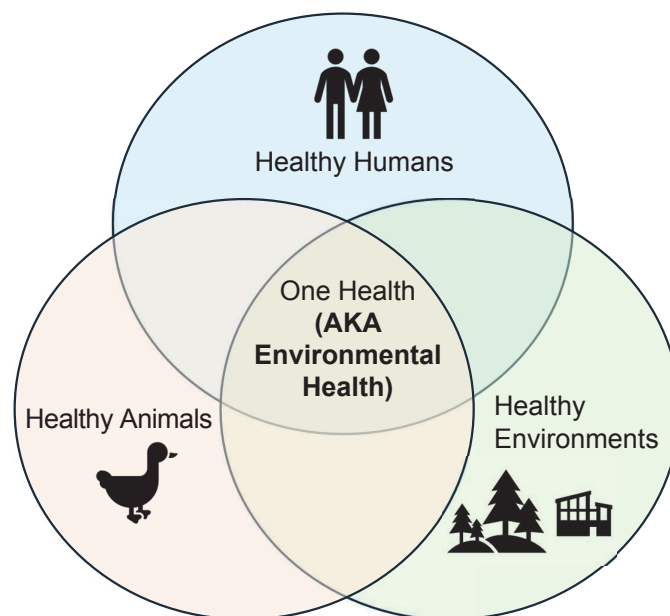
Additionally, in many public health systems, environmental health professionals are embedded within public health structures and deliver integrated interventions that exemplify the One Health paradigm in routine practice. Their work spans, for example, the surveillance and regulation of drinking water and recreational water systems, food safety, vector control, promotion of occupational health, and the management of environmental and climate-sensitive health risks. These activities inherently operate at the human–animal–environment interface.

The management of risks associated with engineered water systems, including the prevention and control of *Legionella* transmission, illustrates how environmental health translates One Health principles into operational practice through environmental surveillance, risk assessment, and enforcement. Similarly, bathing water monitoring programs integrate environmental microbiology, ecosystem health indicators, and population health protection, while vector surveillance and control activities address emerging climate-related disease risks through place-based intervention. These examples demonstrate that environmental health does not merely contribute to One Health conceptually but provides the applied governance and delivery mechanisms through which One Health is enacted on the ground.

Environmental health education and professional training further reinforce this operational role. The discipline is inherently transdisciplinary. This skill set equips environmental health professionals to manage complex exposure pathways and interconnected

FIGURE 2

The One Health Model as Proposed by the Authors



risks across human, animal, and environmental systems, embodying the One Health workforce in practice even where the terminology of One Health is not explicitly used.

Policy and Workforce Implications

Policy Clarity

In their One Health thinking, individuals at the government and organization level must distinguish between ecological health (i.e., the state of natural systems and biodiversity) and environmental health (i.e., the operational discipline that manages risks to human and animal health arising from environmental determinants). Without this distinction, policy frameworks risk misconstrued interpretation of the two domains, perpetuating the conceptual ambiguity that has limited the translation of One Health into action.

Hansen et al. (2025) argue that there should be a “broad and flexible definition of ‘environment’ [in One Health] that may include aspects of the natural, built, social, economic, and socioecological environments.” This framing reflects the long-standing understanding of environmental health by environmental

health professionals rather than representing a shift. By explicitly recognizing natural, built, social, economic, and socioecological determinants of health, policy language can better reflect how environmental health (i.e., One Health) is already practiced, which can enhance policy understanding across sectors and, in turn, support integrated governance and legitimize environmental health involvement in upstream prevention.

Funding Opportunities Missed

One Health has become a research priority. For example, the quadripartite collaboration of the Food and Agriculture Organization (FAO), the United Nations Environment Programme (UNEP), the World Health Organization (WHO), and the World Organisation for Animal Health (WOAH) has as one of its four priority areas “Strengthening One Health Science and Evidence” (WHO, 2022). If environmental health is misunderstood and not recognized as a central contributor to the One Health approach, the discipline is at risk of being overlooked for valuable funding opportunities that directly support the environmental health workforce and, consequently, the aims of One Health.

Conversely, this lack of recognition and misunderstanding could also weaken the One Health approach, because environmental health practitioners might overlook the essential contributions that environmental health can make (Couch et al., 2022). Recognizing and integrating environmental health centrally would strengthen both funding opportunities and One Health outcomes.

Workforce Recognition

Environmental health practitioners are uniquely trained to work at the intersection of human, animal, and ecological health. They embody the One Health workforce, applying risk assessment, regulatory enforcement, and preventive interventions that directly address shared health threats (Robson et al., 2022; Rollings et al., 2024). Environmental health practitioners also possess a generalist skill set, enabling this professional group to address complex and multifaceted environmental health issues and support integrated and holistic responses to complex problems, further embodying the One Health approach (Dunn et al., 2024).

Yet despite their central role, the environmental health workforce has long been under-recognized, underresourced, and in decline in many jurisdictions. Workforce shortages, particularly in local government, limit the ability to deliver essential services such as food safety inspections, outbreak response, and water quality (Whiley et al., 2023). This lack of recognition undermines the operationalization of One Health, because the professionals who enact its principles are often excluded from strategic discussions.

Reframing environmental health as the center of One Health not only acknowledges their contribution but also strengthens their professional identity and visibility, which is particularly important as many countries are

experiencing a decline in student demand for environmental health and increased attrition from professional practice (Ross et al., 2024; Shendell & Aggarwal, 2024; Whiley et al., 2023). Combined, fewer students applying to environmental health courses and higher attrition rates reduce the future environmental health workforce, which in turn weakens its visibility and, therefore, its contribution to One Health.

System Resilience

Embedding environmental health at the core of One Health also enhances the resilience of health systems. The COVID-19 pandemic illustrated the critical need for coordinated surveillance, sanitation, and infection control measures that extend beyond clinical care and into the environments where people live and work (Ryan et al., 2021). Environmental health is the discipline that ensures these systems are in place, adaptable, and responsive to emerging threats. Recognizing its centrality within One Health strengthens preparedness and positions societies to better manage interconnected risks in a changing world.

When environmental health is omitted or misclassified within One Health frameworks, implementation capacity is weakened. Multisector initiatives might emphasize surveillance, modeling, or interagency coordination while underinvesting in the regulatory, inspection, and enforcement systems that translate knowledge into risk reduction at the community scale. This disconnect can result in fragmented governance, delayed interventions, and limited accountability for environmental controls that directly influence exposure pathways. In effect, One Health initiatives risk producing high-quality evidence without the corresponding delivery mechanisms to operationalize these initia-

tives on the ground. Recognizing environmental health as the integrative practice layer of One Health, therefore, addresses a persistent implementation gap and aligns strategic coordination with applied system capacity.

Conclusion

Positioning environmental health at the center of the One Health model corrects a longstanding misinterpretation. It acknowledges that although human, animal, and ecological health are the domains of concern, environmental health is the integrative practice that connects them, manages their interactions, and translates the One Health paradigm into tangible action to protect public health. This reframing highlights not only the conceptual importance of environmental health but also the urgent need to recognize and invest in its workforce. Without this recognition, One Health risks remaining an aspirational ideal. With this recognition, One Health becomes a practical framework already embedded in public health systems worldwide.

We call for environmental health professionals to be explicitly recognized as the key component of the One Health workforce. Environmental health professionals are uniquely trained to address risks at the human–animal–environment interface, bringing regulatory authority, surveillance expertise, and preventive interventions that give operational meaning to One Health. Strengthening and resourcing this workforce is essential to realizing the promises of One Health and ensuring system resilience in the face of 21st-century challenges. 🌿

Corresponding Author: Kirstin Ross, PhD, Professor, College of Science and Engineering, Flinders University, GPO Box 2100, Adelaide SA 5001, Australia.
Email: kirstin.ross@flinders.edu.au

References

- Couch, R., Dhesi, S., Stewart, J., Page, A., & Lynch, Z. (2022). Research and evidence for environmental health policy and practice. In S. Battersby (Ed.), *Clay's Handbook of Environmental Health* (22nd ed., pp. 116–146). Routledge.
- Deiana, G., Arghittu, A., Dettori, M., & Castiglia, P. (2024). One world, One Health: Zoonotic diseases, parasitic diseases, and infectious diseases. *Healthcare*, 12(9), Article 922. <https://doi.org/10.3390/healthcare12090922>
- Destoumieux-Garzón, D., Mavingui, P., Boetsch, G., Boissier, J., Darriet, F., Duboz, P., Fritsch, C., Giraudoux, P., Le Roux, F., Morand, S., Paillard, C., Pontier, D., Sueur, C., & Voituren, Y. (2018). The One Health concept: 10 years old and a long road ahead. *Frontiers in*

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References continued from page 41

- riers in *Veterinary Science*, 5, Article 14. <https://doi.org/10.3389/fvets.2018.00014>
- Dunn, L., Mann, L., & Farquharson, K. (2024). A new conceptualization of the professional practice of environmental health: An Australian qualitative study. *Critical Public Health*, 34(1), 1–17. <https://doi.org/10.1080/09581596.2024.2361153>
- Hansen, A., Chaber, A.L., Reid, S., & Milazzo, A. (2025). Connecting the dots: Systems thinking highlights the role of the environment sector in One Health operationalization. *Global Challenges*, 9(12), e00256. <https://doi.org/10.1002/gch2.202500256>
- Häsler, B., Gilbert, W., Jones, B.A., Pfeiffer, D.U., Rushton, J., & Otte, M.J. (2012). The economic value of One Health in relation to the mitigation of zoonotic disease risks. In J.S. Mackenzie, M. Jeggo, P. Daszak, & J.A. Richt (Eds.), *One Health: The human–animal–environment interfaces in emerging infectious diseases*. *Current Topics in Microbiology and Immunology* (Vol. 365, 127–151). Springer. https://doi.org/10.1007/82_2012_239
- Horefti, E. (2023). The importance of the One Health concept in combating zoonoses. *Pathogens*, 12(8), 977. <https://doi.org/10.3390/pathogens12080977>
- Lee, K., & Brumme, Z.L. (2013). Operationalizing the One Health approach: The global governance challenges. *Health Policy and Planning*, 28(7), 778–785. <https://doi.org/10.1093/heapol/czs127>
- Lerner, H., & Berg, C. (2017). A comparison of three holistic approaches to health: One Health, EcoHealth, and Planetary Health. *Frontiers in Veterinary Science*, 4, Article 163. <https://doi.org/10.3389/fvets.2017.00163>
- Magnano San Lio, R., Favara, G., Maugeri, A., Barchitta, M., & Agodi, A. (2023). How antimicrobial resistance is linked to climate change: An overview of two intertwined global challenges. *International Journal of Environmental Research and Public Health*, 20(3), Article 1681. <https://doi.org/10.3390/ijerph20031681>
- Robson, M.G., Toscano, W.A., Meng, Q., & Kaden, D.A. (2022). Introduction to risk assessment. In M.G. Robson, W.A. Toscano, Q. Meng, & D.A. Kaden (Eds.), *Risk assessment for environmental health* (2nd ed., pp. 1–14). CRC Press. <https://doi.org/10.1201/9780429291722>
- Rollings, K.A., Dannenberg, A.L., Frumkin, H., & Jackson, R.J. (2024). Built environment and public health: More than 20 years of progress. *American Journal of Public Health*, 114(1), 27–33. <https://doi.org/10.2105/AJPH.2023.307451>
- Ross, K.E., Dyjack, D.T., Choonara, A., Davis, G., Dawson, H., Hannelly, T., Lynch, Z., Mitchell, G., Ploompui, I., & Rodrigues, M.A., & Shaw, L. (2024). International environmental health skills, knowledge, and qualifications: Enhancing professional practice through agreements between countries. *Journal of Environmental Health*, 87(2), 20–23.
- Ryan, B.J., Swinton, R., Harris, C., & James, J.J. (2021). Environmental health workforce—Essential for interdisciplinary solutions to the COVID-19 pandemic. *Disaster Medicine and Public Health Preparedness*, 15(2), e1–e3. <https://doi.org/10.1017/dmp.2020.242>
- Sánchez, C.A., Venkatachalam-Vaz, J., & Drake, J.M. (2021). Spillover of zoonotic pathogens: A review of reviews. *Zoonoses and Public Health*, 68(6), 563–577. <https://doi.org/10.1111/zph.12846>
- Shendell, D.G., & Aggarwal, J. (2024). Commentary: Trends in interests of new public health students concerning environmental health. *Frontiers in Education*, 9, Article 1342874. <https://doi.org/10.3389/educ.2024.1342874>
- Velazquez-Meza, M.E., Galarde-López, M., Carrillo-Quiróz, B., & Alpuche-Aranda, C.M. (2022). Antimicrobial resistance: One Health approach. *Veterinary World*, 15(3), 743–749. <https://doi.org/10.14202/vetworld.2022.743-749>
- Whiley, H., Smith, J.C., Moore, N., Burton, R., Conci, N., Psarras, H., & Ross, K.E. (2023). Climate change and health: Challenges to the local government environmental health workforce in South Australia. *International Journal of Environmental Research and Public Health*, 20(14), Article 6384. <https://doi.org/10.3390/ijerph20146384>
- Whiley, H., Willis, E., Smith, J., & Ross, K. (2019). Environmental health in Australia: Overlooked and underrated. *Journal of Public Health*, 41(3), 470–475. <https://doi.org/10.1093/pubmed/fdy156>
- World Health Organization. (n.d.-a). *Environmental health*. <https://www.who.int/health-topics/environmental-health>
- World Health Organization. (n.d.-b). *One Health*. <https://www.who.int/health-topics/one-health>
- World Health Organization. (2022). *One Health Joint Plan of Action (2022–2026): Working together for the health of humans, animals, plants and the environment*. <https://www.who.int/publications/item/9789240059139>
- Yopa, D.S., Massom, D.M., Kiki, G.M., Sophie, R.W., Fasine, S., Thiam, O., Zinaba, L., & Ngangue, P. (2023). Barriers and enablers to the implementation of One Health strategies in developing countries: A systematic review. *Frontiers in Public Health*, 11, Article 1252428. <https://doi.org/10.3389/fpubh.2023.1252428>
- Zhang, R., Tang, X., Liu, J., Visbeck, M., Guo, H., Murray, V., McGillicuddy, C., Ke, B., Kalonji, G., Zhai, P., Shi, X., Lu, J., Zhou, X., Kan, H., Han, Q., Ye, Q., Luo, Y., Chen, J., Cai, W., . . . Zhou, L. (2022). From concept to action: A united, holistic and One Health approach to respond to the climate change crisis. *Infectious Diseases of Poverty*, 11(1), Article 17. <https://doi.org/10.1186/s40249-022-00941-9>