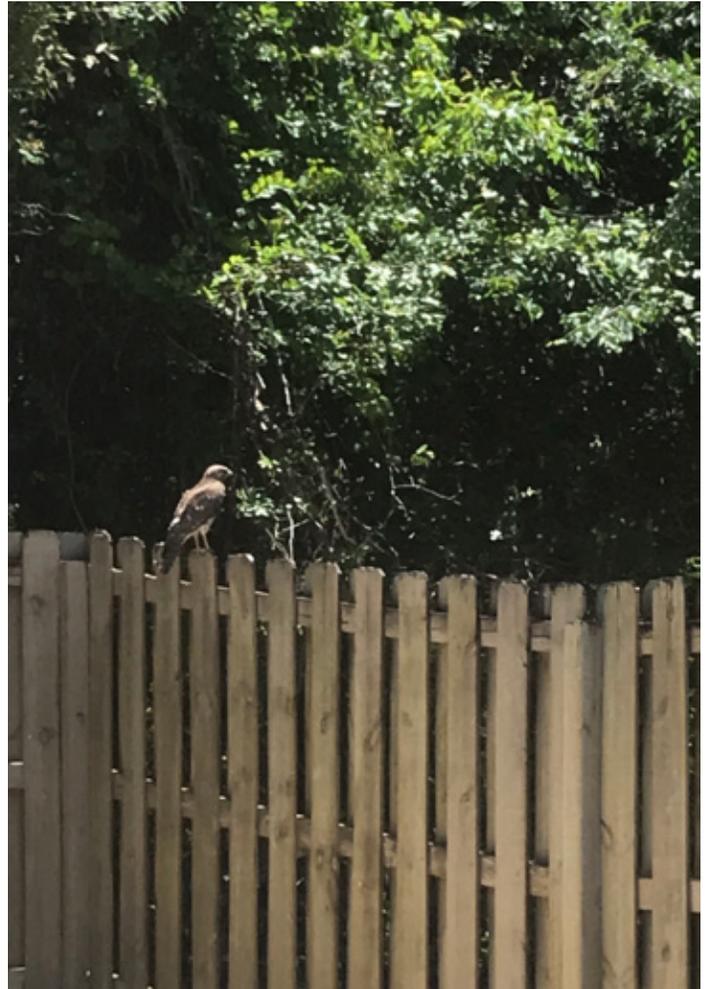## ENVIRONMENTAL HEALTH AND OUR FAILURE— OR FUTURE—TO THRIVE

Rachel Yoho

Hawk on fence

Shortly into the COVID-19 physical distancing, a red-shouldered hawk began visiting my yard. Perhaps the hawk had been there before, but more abnormally, I was there to observe. As I sat and struggled with my new course for the fall, "Climate Change, the Environment, and the Future of Public Health," I realized I couldn't *not* struggle. I was grasping at the details of content. Could I cover enough content? Would sixteen weeks be enough for introducing students to the complexities of climate change and the intersections of human health and the environment? I continued to focus on the deliverables and student learning outcomes. These are admittedly important, but we were in the early struggles of a pandemic and an infodemic.[1] As I stared quietly, I began to focus more on relationships. I needed to focus on our relationships with one another.

While I already had an educationally sound syllabus, thoroughly teased apart and scrutinized by the powers of the academic bureaucracy, I had a reflection of various aspects of climate change and impacts on human lives and society. It covered an introduction to climate science, law and policy, human health, food, national security, and all of the hallmarks of a "good" interdisciplinary, introductory course. What I was missing was an understanding of "us." Summer 2020, a humid pressure cooker, brought a number of issues to a boil. At the forefront of these were the resurgence of the Black Lives Matter movement in societal discourse and also the continued devaluation of knowledge and evidence.

For the briefest of moments, we had been together at home.[2] Ultimately, today's survivors of the COVID-19 pandemic have witnessed the failures of a system, the willful disregard for the simplest of public health actions, and the collective denial of evidence and expertise. At first, there was a shared feeling, an understanding. We were perhaps naively believing, as the law firm's neon billboard near my home shone, "We can beat this virus."

Only a nightmare earlier, my colleagues and I reflected on teaching global health during the outset of a pandemic. For the

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first and hopefully only time in our careers, we watched as our course content came to life around us, shockingly and vividly.[3] Unfortunately, the worst was—and may still be—yet to come. Unfortunately, the worst is also disproportionate. It's socially, racially, and economically stratified. I'm struggling with the knowledge that my climate change course may hasten along the same path.

On an average workday in this horrendous abnormal, I stood from my desk and turned to see a hawk staring at me through the window. My gut reaction: fear. This instant shock of adrenaline in looking closely into the eyes of a beautiful predator jolted my system. This was rapidly displaced by a jumbled thought: "Where's my phone, I need a picture." It was in this I realized this duality. Just as the world peeked in at me through the eyes of the hawk, I glanced back both as me and then through the digital screen of my technology. Was this my disconnect or my documentation? Maybe it was just a swift reaction to a "photos or it didn't happen."

As I imagined a better future, I thought about the change and these connections. I worked to re-imagine struggle as opportunity. Our society has a striking need to understand ourselves. Every time I found an article to include in my new climate change class—to discover, to compare, or to assign—I found it was not what I had anticipated. Our societal discourse has shifted again. We're discussing racial justice and environmental justice so much more. Not only do I have better kindling to spark discussion, we are beginning to look at true, systemic change across intersecting fronts.

Yet I've struggled with this before. My failure to hope. So much of the apathy toward the pandemic, the senseless deaths, and the unknown debilitation is familiar. The tone rings true to the environment. The inevitability of change. The failure to stop the boulder.[4] The acceptance of a future of entire nations lost.[5]

Throughout this pandemic, as I've been wearing a path in the concrete sidewalks of my neighborhood, I've had the limited

pleasure to watch so many local and migratory birds, admire new ducklings learning to explore, and listen to the calls of unfamiliar frogs. These little glimpses of nature continue to give a fresh perspective, while the unexpected rain showers bring harsh glimpses of reality. Maybe we can beat these, the pandemic, the international pledge to limit global warming to 1.5 degrees Celsius[6], the systemic injustices. Certainly we can.

Yet so much of what we need to explore is within ourselves. Some individually, but mostly collectively. In public health, we often talk about the social determinants of health.[7] These are neighborhoods, health care, education, social dynamics,

Hawk on fence through window

Hawk on street sign

and economics. They determine overall conditions of "health." What we fail to acknowledge is that many of those factors are also the determining aspects within our education and training programs. I envisioned a better future. A more inclusive future. A future where students weren't afraid in our schools and campuses. A future in public health where the brightest minds look outward for research and understanding but also look inward for the systemic issues while exploring closer to home. This future had actions that accompany research. The end result is change and not just calls for change moldering away in the online journals. Our trainees become our practitioners. The educational system re-imagined as a truly inclusive space for educators, administrators, and students changes the future and reshapes our path.

This pressure-filled summer, my research group investigated diversity, equity, and inclusion in public health and the health professions. The research call seeking students back in April unfortunately appears prescient. Most importantly, I told my potential students, I envisioned something coming of the work. We did not need just a line item on our CVs and resumes, but rather to gain a greater understanding of our community and to develop skills to continuously improve. This focus on community building is also what I was missing in my climate change class. The continued appearances of my neighborhood hawk reminded me of these deep connections and, ultimately, my current failure to thrive.

Quintessentially interdisciplinary, teaching climate change is a struggle. It's a new struggle, with the topic only reaching the forefront of collective thought in what could be the last few decades, but more likely, the last few months. Nanotechnology, machine learning, and artificial intelligence feel like they have a more established academic foundation. Maybe they simply have a less contentious foundation. In the pre-pandemic days, I walked past the nanotechnology building to my office tucked away in the public health building. Although occasionally wondering why the *nano* building is so large, I more often think about the interdisciplinary. The future of expertise relies on not just understanding the means of communication and disinformation, but being able to communicate at all. For so long, science communication has focused on connecting with the ill-defined "general public." Today we see the pressing need to communicate in all areas. Across all disciplines, education can benefit from a greater understanding of one another.[8] In this shimmering future, education centers on inclusion and emphasizes building true connections across disciplines and demographics.

As we develop collaborative communication skills, we need concrete yet flexible commitments to building a better educational future. Our traditionally siloed departments have a new opportunity to communicate and share. A more rigorously developed educational strategy must center on the terminology and the interactions among disciplines.[9] As my research students investigating communication in the One Health paradigm—the connections between human health, animal health, and the environment—may also observe, we can benefit from

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investigating even the very terminology we use. As we reaffirm our commitments to communication and advancing the educational process, we must affirm, perhaps for the first time, to recognize education as a work in progress in inclusion. But as it's a work in progress, it's a shining opportunity to create a more just and equitable system in a world where 1.5 degrees is possible, and outbreaks can be contained.

An educational change in environmental health must continue to become more responsive and increasingly intersectional. The days of the stereotypical older, white, Birkenstock-clad environmental activists must change (though perhaps we all can try on the Birks). Our students, Generation Z, are experiencing the effects and the questions of a viable future. To make this future viable, environmental and public health education must embrace the struggles of change in order to thrive. The pandemic provided us the impetus to do the impossible in shifting to remote learning in a matter of days.[10] Now we need to protect the health of our students, faculty, and staff while we teach toward a survivable future.

In the fading sunset, I continued to watch one of the area hawks in the top of a dead palm tree. I simply stood and gazed upon it highlighted against the setting sun. From its distance, I could barely see that it was there. There are so many things that we cannot see and so many that are nearly outside of the scope and scale of the imaginable. The multiple and intersecting crises— racial injustice, a global pandemic, and climate change—have provided this new perspective on change. Separation can bring togetherness.

We don't just need hope. Or even action. We need the openness to embrace our challenges, shortcomings, and faults. Inclusive approaches to address environmental issues in a just and equitable society cannot just save lives but save our future. This future is determined by the educational and training systems. More inclusive classrooms and more inclusive academic units have the power to make our local, regional, and global community better and our future possible.

Hawk on dead palm in distance with setting sunlight

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training and research in biology, environmental engineering, applied microbiology, and science education. Disclaimer: All views those of the author and do not necessarily reflect those of affiliated institutions.

NOTES

1. An infodemic is an overabundance of information—some accurate and some not—occurring during an epidemic. See https://www.who.int/news-room/events/detail/2020/06/30/default-calendar/1st-who-infodemiology-conference, accessed October 3, 2020.

2. See https://www.globalcitizen.org/en/connect/togetherathome/, accessed October 3, 2020.

3. R. Yoho, E. Coker, and E.A. Wood, "Reflections, Considerations, and Recommendations for Teaching Global Health during a Pandemic" (unpublished manuscript, May 2020).

4. R. Yoho, "Hope in Discussing Environmental Issues," Minding Nature 12, no. 3 (2019): 107-111, https://www.humansandnature.org/filebin/pdf/minding_nature/fall_2019/Hope_In_Discussing.pdf

5. E. Holthaus, The Future Earth: A Radical Vision for What's Possible in the Age of Warming (New York: HarperCollins. 2020).

6. Intergovernmental Panel on Climate Change, Global Warming of 1.5°C: An IPCC Special Report on the Impacts of Global Warming of 1.5°C above Pre-industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty, V. Masson-Delmotte et al., eds. (IPCC, 2018), in press, https://www.ipcc.ch/sr15/download/#full.

7. For resources at the Centers for Disease Control and Prevention on the social determinants of health see https://www.cdc.gov/socialdeterminants/index.htm, accessed October 3, 2020. See also healthypeople.gov, https://www.healthypeople.gov/2020/topics-objectives/topic/social-determinants-of-health, accessed October 3, 2020.

8. R. Yoho et al., "Structure and Function Relationships in the Educational Expectations of Professional Societies Across the STEM Disciplines," Journal of College Science Teaching 47, no. 6 (2018): 24-31.

9. R. Yoho, "Understanding and Addressing Ambiguity in the STEM Classroom" (unpublished manuscript, April 2020).

10. R. Yoho, The One with the Pivot, Edge for Scholars, https://edgeforscholars.org/the-one-with-the-pivot/, accessed October 3, 2020.