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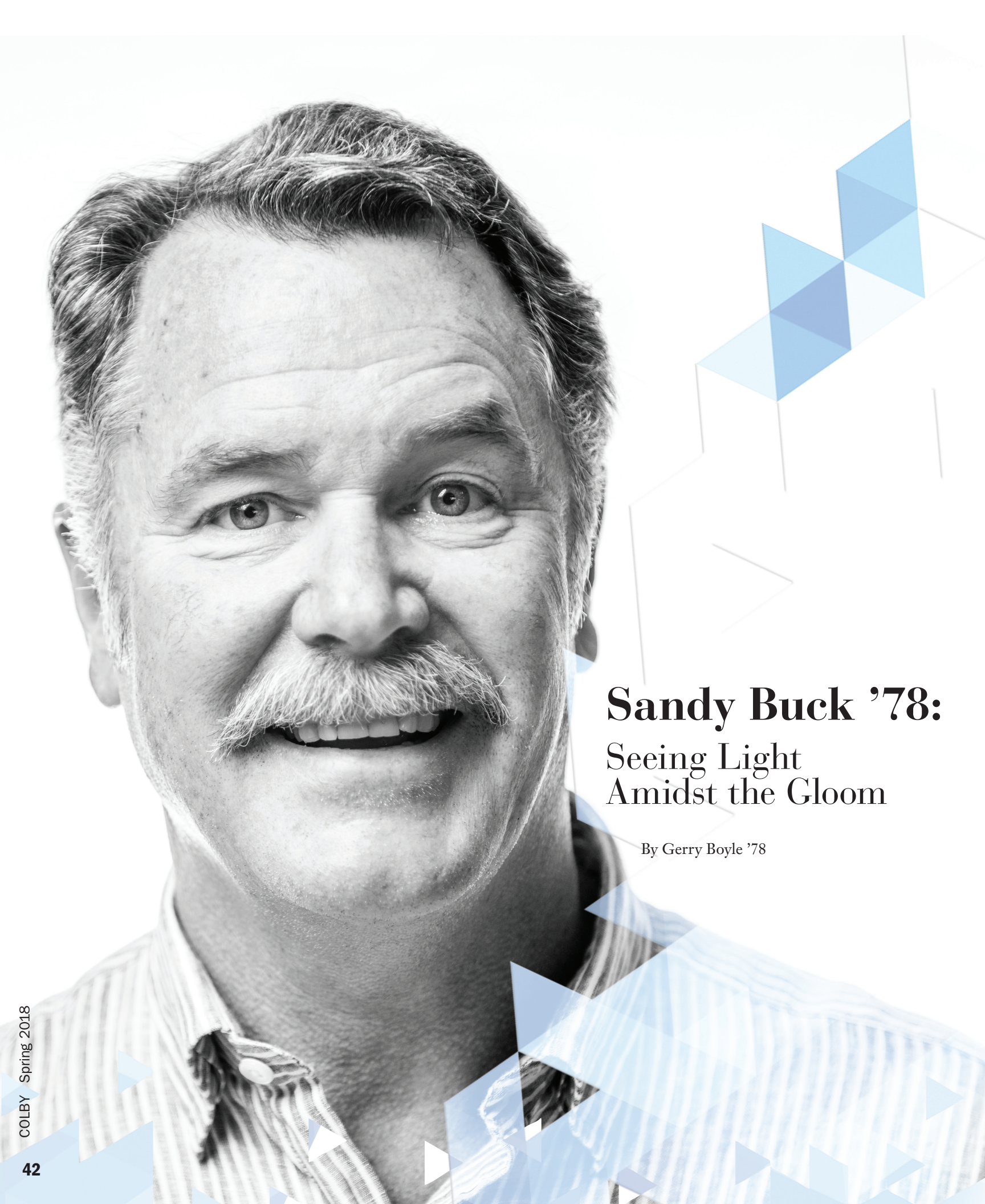
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Sandy Buck '78: Seeing Light Amidst the Gloom

By Gerry Boyle '78

Sandy Buck '78 was in the office of the Horizon Foundation, on Commercial Street in Portland's Old Port, talking about climate change. He also wanted to talk about a Colby alumna, Maggie Parrish '15.

Buck, a Colby trustee who, with his wife, Sissy, established the Buck Lab for the Environment and Climate Change at Colby, had recently met Parrish, a biology major from Falmouth, Maine, who spent a semester studying in Cape Town, South Africa.

"I had a cup of coffee with her this morning," Buck said. "She went back after graduation and got a master's degree at the University of Cape Town. She said, 'I had exposure to a broad, international community of people working on climate change and the effects. But I feel like I can have an impact in Maine.'"



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—Sandy Buck '78

I was like, 'Damn right. We need people like you.'"

Buck eagerly connected Parrish to the Maine Climate Table, a consortium of climate-related organizations, and to other organizations.

"Suddenly the day is a lot brighter," he said. "If you read the macro story, it's doom and gloom and horrifying. We've ceded any leadership to China in renewable energy. We've put all the wrong people in positions of power. ... So if you look at the macro, you could come to a grinding halt and throw your hands up. But when you look at the local, and even state and regional levels, there are reasons for hope."

When it comes to climate, Buck has done anything but throw up his hands.

In its first year, the Buck Lab has facilitated connections between students and environmental organizations for internships and jobs (see related story about Director Gail Carlson, P. 40) and funded faculty and student research, including ice-core study this summer in Alaska and at Colby, among other projects.

It's just one part of the initiatives that Buck has started since returning to Maine, renewing a lifelong relationship with the state and the outdoors. A New Jersey native who spent his childhood rambling around the family farm, Buck attended Camp Kieve in Nobleboro, Maine, and is a longtime trustee there. He moved to the Portland area a dozen years and is more likely to wear boots and jeans to a meeting than a suit.

Both the foundation and the Bucks have funded many climate-related initiatives. But three years ago, Sandy Buck felt that he was "just throwing stuff at the wall" and working in a silo without a real strategy. He decided it was time to bring Maine's climate-funders (as he describes them) together. "What are we all doing?" he asked. "Where are the overlaps? What are we learning? How can we share that information?"

He hired a consultant who helped create a climate-related group with 25 members that now meets every three or four months. With pooled funding and a refined focus, the group has tackled big projects and found success that none of their organizations or foundations could have achieved alone.


The Maine group invited national climate-funders to the meetings and decided to go to work to bolster the Regional

Greenhouse Gas Initiative, which has brought Northeast and Mid-Atlantic states together to reduce greenhouse gas emissions. By selling emissions allowances, the states boost clean energy and green jobs.

But the consortium was having a hard time explaining the economic benefit. The Maine group, including Buck, helped pay for a detailed economic analysis that showed that the initiative had a major impact in jobs and emissions reductions, especially in Maine, he said.

Buck talks excitedly about the consortium's efforts, from bringing in a marketing expert to better coordinate the message around climate change, to efforts to help Mainers reduce fuel costs and emissions, to finding the way to quantify the impact of climate down to the cost of major storms on town budgets, to climate-friendly no-till farming, to a proposed study of ways to maximize carbon uptake in Baxter State Park. "It's like pulling up the window shade on a whole bunch of really inspiring local and regional activities," he said.

And much of the needed expertise, he said, will come from the next generation of environmental studies and biology majors at Colby, who, like Parrish once was, are being dispatched into the field to do internships and research and will bring that knowledge to the search for solutions.

"This is not an ivory tower," Buck said. "It's not trivial stuff they're researching. They're researching real science that is important and needs to be explored." 

On a smoggy day, when it's harder to see the skyline, we get a glimpse of something else: The complex story of our air.

From driving cars to spraying chemicals to making electricity, modern life sends a cocktail of gases into the atmosphere every day. We know that some of these gases are stoking climate change and pollution, but the details of how these compounds react with the natural world are still, well, hazy.

Associate Professor Karena McKinney, an atmospheric chemist who joined Colby's faculty in 2017, studies those details. Specifically, she explores what happens when emissions from humans collide with those from trees and plants.

Standing forests play a critical role in socking away planet-warming carbon dioxide. But they also emit

with each other to produce more oxidants—namely ozone, she says, “which essentially means you’re making smog.”

To conduct their work, McKinney and other atmospheric researchers often measure the air from towers above the forest canopy or at “receptor sites” where emissions from people meet those from trees. Lately, though, McKinney has been experimenting with drones to get to territory that’s otherwise unreachable. She has designed and built an air sampler specifically to fly on a commercial drone. “That’s going to be a powerful new way of collecting samples,” she said.

She knew by her junior year at Harvard University that atmospheric chemistry would be her field. “I got excited about the idea that I could both do chemistry



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—Karena McKinney,
associate professor of atmospheric chemistry

volatile organic compounds (VOCs) the same types of gases we try to minimize in paints, carpets, and other human-made products.

These plant-produced, or biogenic, VOCs, have always been a part of the natural cycle. What's changed, McKinney said, is that in an industrialized world, “there can be interesting interactions between natural emissions and anthropogenic emissions that can actually shift the chemistry in ways that produce pollution.”

McKinney has demonstrated this effect in the Amazon by sampling rainforest air downwind of Manaus, a Brazilian city of about two million people. Like other urban areas, Manaus gives off nitrogen oxide, or NO_x: “You get lots of it anytime you have a city with cars and power plants and lots of oxidation going on,” McKinney said.

She and her fellow researchers have been able to demonstrate that when those human-caused NO_x emissions meet the rainforest VOCs, they react

and do something that had this very tangible effect in terms of its benefit for society,” she said.

The chemistry of our air involves a fine balance with many questions yet to be answered. How that balance tips in different scenarios is intricately tied to climate change, of course, but it also has implications for respiratory health and how we use land—even the kinds of trees we plant in city parks. It turns out that VOC emissions vary among species.

“We need to have a pretty detailed understanding of these underlying mechanisms,” McKinney said, “in order to be able to have effective policy.”

If we want to control air quality and address climate change, she emphasizes, the solution won't involve fiddling with nature's emissions—it will be about cleaning up man-made ones.

“Yes, the biogenic emissions contribute” to pollution, she said. “But that's not the knob that you want to turn.” 🌍