THE FIRE PARADOX: A THREAT, BUT PART OF THE SOLUTION

YSE alumni are combining innovative forest restoration treatments with traditional land management methods to make ecosystems more resilient to destructive wildfires.
When the Intergovernmental Panel on Climate Change (IPCC) released its latest report this spring (Sixth Assessment Report, Working Group III), like many of you, I felt alarmed by its stark analysis of the climate emergency and the breadth and scale of its impact — from intensifying threats from wildfires, heat waves, drought, rising sea levels, and natural disasters to disruptions in food systems and forced migration.

Yet it has also made me more determined than ever to continue working to create opportunities here at YSE for students and faculty to pursue the type of solutions-based scholarship that is critical if we are to avoid the direst impacts of climate change — and do so in a way that is just and equitable.

In this issue of Canopy, I hope you’ll enjoy reading about some of the work on the GHG emissions different water bodies send into the atmosphere — factors that influence and could mitigate them — and the potential for enhancing the ability of coastal and marine ecosystems to store so-called “blue carbon.” You also can read about the work our amazing alumni and students are doing to better understand fire ecology and the role fire can play in land restoration. I am also excited about the new partnerships that we are forming — across Yale, the country, and internationally — that give us new opportunities to pursue our science-to-solutions scholarship. The Central Park Climate Lab, for example, is a first-of-its-kind initiative launched this year with the Central Park Conservancy and the Natural Areas Conservancy that is aimed at helping cities develop strategies to manage and mitigate the impacts of climate change on urban parks.

As always, I am looking forward to continuing this work with all of you. The dedication of our community — of our faculty, staff, alumni, supporters, and incredible students — never ceases to amaze and inspire!

Indy Burke
Carl W. Knobloch, Jr. Dean
Coral Vita Wins Earthshot Prize

Coral Vita, the world’s first commercial land-based coral farming company for reef restoration founded by Sam Teicher ’15 MEM and Gator Halpern ’15 MEM, was named a winner of the inaugural Earthshot Prize. The startup was one of five winners of the £1 million grand prize awarded by Prince William, Duke of Cambridge, who established the global competition to provide financial support to innovators to protect the ecosystems that sustain us all. "It’s the honor of our lives to have Coral Vita named a winner of the inaugural Earthshot Prize jump-starting this effort to rebuild reefs around the world," says Teicher. "We look forward to scaling our efforts around the world and collaborating with local communities, scientists, governments, the private sector, and innovators to protect the ecosystems that sustain us all."

Bahamas-based Coral Vita aims to grow coral species that are resilient to changing ocean conditions — at a rate up to 50 times faster than traditional growing methods. The company believes its methods could potentially supply coral for an entire country and the U.N. Young Champions of the Earth Prize. The five Earthshot winners were chosen from three nominees in five categories. Another nominee, Restor, was founded by former YSE postdoctoral fellow Thomas Crowther and is headed by CEO Clara Rowe ’15 MEM.

New Horizons Conference

For the second straight year, YSE hosted the New Horizons in Conservation Conference, an annual gathering of students and early-career professionals who are historically underrepresented in the environmental field and/or committed to diversity, equity, and inclusion in the field. The conference is organized by the Justice, Equity, Diversity, and Sustainability Initiative. Panels covered a range of topics, including energy justice, food justice, land rights and repatriations, disaster and resilience, environmental enforcement, environmental quality, and just transitions. Speakers included Brenda Mallory, chair of the Council on Environmental Quality in the Biden administration; Frances Beinecke ’71 BA, ’74 MFS, former president of the Natural Resources Defense Council; and Ebony Martin, co-executive director of Greenpeace USA.

"There is so much work to be done" on environmental justice, said Dr. Dorceta Taylor, who serves as senior associate dean of diversity, equity, and inclusion and professor of environmental justice at YSE. Taylor, who established New Horizons, opened the conference with findings from her ongoing research on issues of diversity and compensation among leadership in environmental organizations.

Crop Byproduct App Nabs Geneva Challenge Top Prize

A team led by YSE students Veenu King ’22 MEM, Elaine Lac ’22 MEM, and Maximilian Schober ’22 MEM won the Geneva Institute’s 2021 Geneva Challenge for creating an app that helps farmers find viable alternatives to burning harvest byproducts. The app, called BuyBy, acts as a centralized marketplace that connects farmers with buyers who can use crop byproducts for inputs into sustainable textiles, pulp and paper, dyes, and biofuel. The concept is based on principles of the circular economy and industrial symbiosis, where waste products are reused and become valuable commodities in the marketplace. The app currently focuses on the Punjab region of India — where emissions from the burning of byproducts accounts for 40% of New Delhi’s air pollution — but the students say the model is designed to be replicated and scalable.

"This project and the experience itself gave us validation of our ability to be entrepreneurial and that our solution is necessary and innovative," King says.

Father of Green Chemistry Awarded Prestigious Volvo Prize

Paul Anastas, Teresa and H. John Heinz III Professor in the Practice of Chemistry for the Environment, was awarded the 2021 Volvo Environment Prize in recognition of the transformative impact of his work across numerous sectors and industries. Anastas is considered the founder of the field of green chemistry — the design of products and processes to reduce or eliminate the use and generation of hazardous substances. "Generations both alive and yet unborn have him to thank for prodigious amounts of toxins not created, pollution not released, resources not wasted, and cleanup costs not incurred as chemistry enriches our lives — now, thanks to him, far more thoughtfully and harmoniously with all life," said Amory Lovins, co-founder and chair emeritus of the Rocky Mountain Institute.

Anastas headed the research program at the Environmental Protection Agency from 2000 to 2012, and his career includes stints at the White House Office of Science and Technology Policy and the American Chemical Society’s Green Chemistry Institute, which he founded in 1997. He is the co-founder and director of the Center for Green Chemistry & Green Engineering at Yale.
YSE’s Leadership Council returned to Kroon Hall April 21-22 for its first in-person meeting since 2019, with several members joining virtually as well. Presentations focused on exciting work underway at YSE in forests, carbon capture, equitable energy transition, and the potential of cities to drive climate solutions.

Yale President Peter Salovey joined the Council for remarks and a Q&A, during which he described YSE’s leadership role in the University’s new Planetary Solutions Project. Council members were delighted to spend time networking with each other, YSE’s professors, and students during meals and engaging breakout sessions.

“It was wonderfully stimulating to be back together in person, gathering mutual inspiration from the many ways in which the YSE community is contributing solutions to climate change and other environmental challenges,” Dean Burke said.

Helping Cities Protect Their Urban Parks

YSE is partnering with the Central Park Conservancy and the New York City-based Natural Areas Conservancy in a new initiative to study the on-the-ground impacts of climate change on urban parks. The goal of the initiative, called the Central Park Climate Lab, is to work with cities across the U.S. to advance and implement urban park strategies to mitigate and adapt to climate change and understand how these essential greenspaces could be used to create more resilient futures.

“Parks are essential for New Yorkers, as this last couple of years have proven, but flooding, high winds, and extreme temperatures pose a threat to their health,” says New York City Mayor Eric Adams. “The Central Park Climate Lab begins a new era in research and cooperation that will give our park professionals improved tools to combat the climate crisis, and it will be a model for urban parks across the country.”

The initiative will include YSE Professors Karen Seto and Mark Bradford as well as Sarah Charlop-Powers ’09 MEM and Clara Pregitzer ’20 PhD from the Natural Areas Conservancy.

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RESEARCH UPDATES

Indigenous Nations in U.S. More Vulnerable to Climate Change

In a first-of-its-kind study, a team of researchers led by YSE Professor of Sociology Justin Farrell found that Indigenous nations across the U.S. have lost 98.9% of their historical land base and this land dispossession is associated with current and future climate risks.

The study, published in Science and made public in collaboration with the Native Land Information System, quantified the loss of Indigenous land since Europeans first settled in the U.S. More than 40% of tribes now possess no federally recognized land. The study also found that historical land dispossession was associated with current and future climate risks. Indigenous peoples were forced to move to lands that are more exposed to a range of climate change risks and hazards and are less likely to lie over valuable subsurface oil and gas resources. Present-day lands endure, on average, an increased number of extreme-heat days compared to historical lands. Wildfire risks are also more severe for about half of all tribes.

“There is a violent legacy that persists today, and it remains critical that we try to understand it at large scales. This is not only for historical clarity around land dispossession and forced migration but for concrete policies moving forward: How can we use this information so that day-to-day lived experiences of Indigenous peoples are improved — so that existing inequities are righted and future risks mitigated?” Farrell says.

Need for Greater Focus on Environmental Justice for LGBTQ+ Community

More than 1 in 3 LGBTQ+ Americans faced discrimination of some kind during 2020, including more than 3 in 5 transgender Americans, according to the Center for American Progress. A new paper, published in the American Journal of Public Health by Michelle Bell, Mary E. Pachucki Professor of Environmental Health, and Leo Goldsmith ’20 MEM, examines how the discrimination is putting the LGBTQ+ community disproportionately at risk to environmental exposures.

The paper identifies air pollution, environmental disasters, and secondhand smoke as having a disproportionate impact on LGBTQ+ populations. It outlines recommendations including anti-discriminatory policies within health care and the federal government, policies to aid the ability of transgender and nonbinary individuals to obtain appropriate identification documents, and the incorporation of LGBTQ+ issues into environmental justice research and organizations.

YSE Industrial Symbiosis Research Spurs Partnership with World Bank

A new World Bank platform, based on YSE’s research through the Center for Industrial Ecology, is helping to promote opportunities for the reuse of waste materials — a process known as industrial symbiosis — across a worldwide digital marketplace.

The platform will help foster industrial symbiosis opportunities in Eco-Industrial Parks, particularly in developing countries.

The data will include information on renewable technologies, waste management strategies, and environmental performance.

YSE PhD student Koji Kanaoka has been working under the direction of CIE Director Marian Chertow, professor of industrial environmental management, to identify companies that can utilize each other’s byproducts for the platform — including those in the U.S.

“The idea is to try to avoid waste by maximizing the number of possible exchanges among the companies,” says Chertow, who is leading the partnership with the World Bank.
Electric Vehicles Have Emissions Advantage over Conventional Vehicles

Some analysts have raised concerns over how green the electric vehicle industry is, focusing particularly on indirect emissions caused within the supply chains of the vehicle components and the fuels used to supply the power that charges the vehicles.

A new study published in *Nature Communications* shows that the total indirect emissions from electric vehicles pale in comparison to the indirect emissions from fossil fuel-powered vehicles.

A research team, which included YSE Environmental and Energy Economics Professor Ken Gillingham, combined carbon pricing, life cycle assessment, and modeling energy systems to compare fossil fuel and electric vehicles.

“A major concern about electric vehicles is that the supply chain, including the mining and processing of raw materials and the manufacturing of batteries, is far from clean,” says Gillingham. “So, if we priced the carbon embodied in these processes, the expectation is electric vehicles would be exorbitantly expensive. It turns out that is not the case.”

Poor Households in India Bear Brunt of Pollution Effects

Poorer households in India are bearing a disproportional impact from pollution caused by others, a study published in the journal *Nature Sustainability* found.

YSE Associate Professor of Energy Systems Narasimha Rao, the study’s lead author, said the data will likely hold for other countries with similar issues.

The study is the first to analyze and review how different households contribute to air pollution. It also examines the impact of the pollution on households according to income level and defines a new pollution inequity index.

While industrywide pollution controls can reduce inequity in the impacts of ambient air pollution, providing low-income households with clean cooking fuels remains the most effective way to reduce the number of premature deaths from air pollution in India, the authors concluded.

Planning Cities for Sustainable Biodiversity

Within the next 30 years, the global urban population is projected to increase by 2.5 billion people, which will increase urban spread by 1.53 million square kilometers, directly threatening 855 species, according to the findings of a new study published in the *Proceedings of the National Academy of Sciences of the United States of America*.

The study relied on data from Yale’s Map of Life — a collection of species distribution data. The cities that pose the greatest threat to species due to expansion are predominantly located in the developing tropical regions of sub-Saharan Africa, South America, Mesoamerica, and Southeast Asia.

“Cities are actually part of the solution,” says Karen Seto, Frederick C. Hixon Professor of Geography and Urbanization Science, who co-authored the study with PhD student Rohan Simkin; Walter Jetz, director of the Yale Center for Biodiversity and Global Change and professor of ecology and evolutionary biology; and Robert McDonald, lead scientist for nature-based solutions at The Nature Conservancy. “We can build cities differently than we have in the past. They can be good for the planet; they can save species; they can be biodiversity hubs and save land for nature.”
Sustaining the Financing to Preserve Bhutan
Dechen Dorji ’01 MEM, who was an international student at Yale from Bhutan, began his conservation work in the country’s remote eastern region and soon started playing a key role in the country’s constitutional mandate to remain carbon neutral for its entire existence.

Dorji came to Yale after meeting YSE’s Frederick C. Hixon Professor Emeritus of Natural Resource Management William Burch, who was working in Bhutan. After graduation, Dorji returned to his country to work on community forestry and helped lead efforts to preserve its forest cover, which sequesters about three times more carbon dioxide than the country’s total population of about 800,000 emits. He helped raise $40 million for the sustainable financing of Bhutan’s park system under the Bhutan for Life initiative.

As the World Wildlife Fund’s senior director for the Asian Wildlife Program, Dorji continues to work on land preservation and the protection of endangered and threatened species.

Reducing the Carbon Footprint on College Campuses
In her more than 20 years in higher education, Nan Jenks-Jay ’86 MESc has been a leading voice for environmental education and sustainability in higher education, catalyzing environmental programs around the country and globally.

During her time at Yale and graduate school, Jenks-Jay says attending lectures by visionary leaders, studying collections at the Peabody Museum, and reviewing rare works at the Beinecke Library influenced her trajectory in life: “I was truly influenced by faculty whose research and publications were cross-disciplinary with other scholars. Subsequently, collaborations became the foundation of my work,” she says. “I gained the confidence to be a calculated risk taker, moving bold ideas ahead with diplomacy and perseverance.”

In 1998, she was appointed dean of environmental affairs at Middlebury College — a position she would hold for the next 23 years. It was there that she hit her stride. Middlebury began to reduce its carbon footprint in 2001 and set an initial goal to lower all carbon emissions to 8% below 1990 levels by 2012. With Jenks-Jay’s help and support from students, Middlebury reached carbon neutrality in December 2016.

“I think you have to look for opportunity because just like inspiration, it’s out there,” she says. “You need to watch trends and be a predictor and forecaster as opposed to a reactor. Because if you’re a reactor, you’re already behind the game.”

Fighting to Save Brazil’s Tropical Forests
Daniel Piotto ’06 MF, ’11 PhD first met renowned forestry professors Mark Ashton, Morris K. Jesup Professor of Silviculture and Forest Ecology and senior associate dean at The Forest School, and Florencia Montagnini, senior research scientist, while earning his master’s degree in forest management at Centro Agronómico Tropical de Investigación y Enseñanza in Costa Rica. They were working on what would become YSE’s Environmental Leadership & Training Initiative (ELTI).

That first meetup convinced Piotto to apply to YSE — a decision that ultimately led to a master’s degree, a doctorate, and YSE-supported trips to forests across the world that expanded his knowledge of different forest biomes and how to manage forest resources. He recently has led studies on forest restoration and plantation forests in the Bahia region of Brazil and is hoping his work in forest restoration and plantation forestry can help counter devastating tree loss and fires in one of the country’s “last frontiers.”

“I’ve dedicated my life to studying this, so I remain optimistic. These forests can grow back,” says Piotto. “I’m not optimistic that people are going to change their behavior in the short term, so now we ask, ‘How can we adapt?’ Planting trees, managing these forests — that is going to be a very important component.”
For Carlos Velazquez ’22 MEM, nature was always about family. He remembers taking the drive down to Guayanilla, Puerto Rico, to visit his great aunt’s house, running outside through the rain with his cousins, and waiting for the water in the nearby brook to rise so they could splash in the fleeting little pools that emerged.

But when Hurricane Maria struck in 2017, Velazquez’s relationship to the environment changed. After seeing the landscape of his childhood littered with debris, he became much more protective of his environment — of the trees, the water, and the land that had given him so much joy all through his childhood.

“The entire island was hit hard,” Velazquez says. “My family were among the lucky ones. Coming back home, seeing the devastation, and participating in relief efforts is what brought me into disaster resilience and recovery.

After completing his undergraduate work in environmental engineering at Georgia Tech, where he researched effective hurricane responses, Velazquez says he was drawn to YSE’s environmental management program and the range of courses it offers including stormwater management, coastal engineering, and cultural management. His focus is on natural ecosystems.

Velazquez also was interested in the opportunity to enter a dual-degree program in engineering with Tsinghua University in China. As an undergraduate, Velazquez had studied abroad in Tsinghua and met a student enrolled in the unique program. After speaking with her, he realized it was exactly what he wanted to do after graduation. The program enables Yale students to enhance their expertise in key areas of environmental engineering, including industrial systems, pollution management, water treatment, and energy technology.

Another opportunity to broaden his skill set came last summer when Velazquez interned with YSE’s Urban Resources Initiative to pursue New Haven community forestry projects. The time spent helping small communities plan and implement their environmental goals as an intern was invaluable, he says. It gave him the opportunity to learn skills that will help him assist communities in the future, including his home in Puerto Rico.

Chris Oryck, Velazquez’s supervisor at URI, praises his undying can-do attitude and how he earnestly approaches every situation as a learning opportunity.

“In my world, he’s a rock star,” Oryck says. “His rapport with people was endearing, and everybody in the community felt that he was in the struggle with them, not that he was an outsider. It’s magic when that happens. I’ve seen hundreds of students over the years, and he’s in the top five.”

Velazquez says his experience at YSE has given him a clear direction.

“More than the classes and the degree, my YSE experience has truly been defined by the people I’ve met and the stories they’ve shared. The vast spectrum of backgrounds, life experiences, and career paths has opened my eyes to the near limitless amount of ways I can choose to make a positive difference in the world,” he says.

His ultimate goal is to return to Puerto Rico and use the skills gained at YSE to try to create a new framework for disaster relief on the island — one more heavily centered around local communities.

“There must be major reforms in order to come back from a storm like Maria,” Velazquez says. “I want to make sure that, as these reforms happen, the focus is communities that have less resources when disaster strikes.”
“My YSE education was a perfect primer for working in a small island, where you have to be a jack of all trades. I relied on everything from GIS to policy synthesis training, mock climate negotiations, and green finance coursework.”

The numbers alone can be abstract, clinical. It is difficult, when considering climate change, to envision the difference between a global temperature rise of 1.5 degrees Celsius over the preindustrial baseline and a rise of 2 degrees.

“But for us, it’s existential,” says Lia Nicholson ’14 MEM. “We all need to recognize that the difference in those temperatures has huge costs for small islands.”

Nicholson traveled to Glasgow at the end of 2021 to attend the 26th annual Conference of the Parties — or COP26 — hosted by the U.N. Framework Convention on Climate Change. There, she served as lead negotiator for the Alliance of Small Island States. This bloc of 39 small island nations, which together comprise 20% of all U.N. member states, joined forces 30 years ago in an effort to amplify common concerns around the changing climate. (AOSIS has since adopted positions on issues of sustainable development and ocean conservation.)

Nicholson was born and raised on Antigua, where one of her early childhood memories is the world-ending intensity of a Category 5 hurricane passing over her house. She was involved in environmental issues from a young age and, in college, wrote her thesis on the problem of soil erosion due to colonial grazing practices. She was drawn to the Yale School of the Environment because of its focus on the applied management of environmental policy and principles. There, she worked with several “excellent professors,” she says, and shifted her concentration to the concern of climate change.

After graduation, Nicholson returned to Antigua and began a job in the island nation’s Department of the Environment. Although most of her efforts centered on local environmental issues, the work had an international feel, as Antigua is part of a “mini-EU of regional islands,” as Nicholson puts it. She also found herself increasingly enmeshed in the world of international institutions as she pushed to secure $30 million of climate finance for Antigua for adaptation and restoration measures.

“My YSE education was a perfect primer for working in a small island, where you have to be a jack of all trades. I relied on everything from GIS (geographical information systems) to policy synthesis training, mock climate negotiations, and green finance coursework,” Nicholson says.

After four years in Antigua, she spent two years with the C40 Cities Climate Leadership Group as technical advisor in West Africa, based in Lagos, and then in early 2021 rejoined the Antigua and Barbuda government in her current role at AOSIS — a two-year term that is halfway done. When thinking about the recent work at COP26, Nicholson describes success on some fronts despite the conference’s sprawling nature.

“I was inspired by the way Lia was able to take in all the information at an event like COP26 and respond in a rational and thoughtful way,” says Jillian Aicher ’23 MEM, who worked alongside Nicholson at COP26 by way of the class “International Organizations and Conferences.” (Nicholson also took this class and served as a teaching assistant for one semester.) “With all that was happening, she remained an incredibly effective advocate for the goals and mission of AOSIS.”

Most notably, Nicholson points to the call to phase out fossil fuel subsidies. But even with this win, huge questions of financial responsibility and moral accountability remain unanswered, and to these she continues to commit her energies.

“The COP is a moment, but as soon as 26 ended we started to plan for 27,” she says. The gains of last year propel the demands of this year.

“How do we cut emissions faster and make more climate finance available to small islands? We’re on a trajectory to overshoot 1.5 degrees, but 1.5 must be our ceiling,” says Nicholson.
Listening to and Learning from Farmers

Environmental lawyer Claudia Ochoa learns up close how independent farmers are adapting to climate change.

BY THERESA SULLIVAN BARGER

Claudia Ochoa ’22 MEM has worked on climate change issues at the national and international levels, but her internship at a New Haven nonprofit taught her that real change starts at the local level — with the farmers.

Ochoa, an environmental lawyer from Peru, learned about how farmers are problem-solving and adapting to climate change while working for CitySeed, a New Haven-based nonprofit that promotes economic and community development and sustainable agriculture. It is run by Cortney Renton ’20 MEM.

Heat waves, unpredictable and extreme weather, and soil degradation — all symptoms of climate change — have made farming much more difficult. To dig deeper into the challenges farmers are facing, she immersed herself in CitySeed’s network, listening to the people it serves so she could help write grants for it. She met with immigrant and refugee chefs from several nations who prepare meals at CitySeed’s Sanctuary Kitchen, cooked meals herself, and visited the farmers market every Saturday.

“I’m convinced that most of the solutions already exist. The knowledge comes from the vendors in the farmers market,” she says.

To adapt to climate changes, farmers are making several modifications, including finding more suitable locations to grow their fruits and vegetables, switching to different varieties, and amending harvest and transportation techniques, Ochoa learned. For example, climate change conditions have made red tomatoes less flavorful, so farmers are growing more yellow tomatoes, which better maintain their flavor in drought conditions. To adapt to heavy rain in shorter periods of time — which causes fruit grown in fields, such as strawberries, to become water-logged and lose their sweetness — farmers have added soil to elevate the fruit and allow excess water to flow away from the roots and plants. In the past, farmers were able to transport their fruit to market without refrigeration, but extreme summer heat has caused the fruit to overripen on the trip. So they have started packing their produce in ice and coolers to keep it from spoiling.

“It is all about knowing more about the projections of climate and how it will affect different things: land, water, biodiversity, and other factors,” she says. While at YSE, Ochoa says she gained valuable knowledge of forests that will help in her future environmental law work with developers. Through her silviculture class and experience at Yale-Myers Forest, she developed a better understanding of different ecosystems and forest management techniques used to protect biodiversity and help forests adapt to climate change.

“That hands-on, lived experience was unlike anything she could learn from a book, and it deepened her understanding of land use issues, the history of the land, Indigenous communities, and biodiversity, she says. After she completes her master’s degree, she plans to enroll in a doctoral program in social sciences and continue working on climate change and biodiversity projects that allow her to connect local actions to global solutions.

“We need to listen to the people who already have the tools and knowledge to adapt to climate change,” Ochoa says. “Maybe there are not enough people at the national and international level listening to those voices.”
THE FIRE PARADOX: A THREAT, BUT PART OF THE SOLUTION

YSE alumni are combining innovative forest restoration treatments with traditional land management methods to make ecosystems more resilient to destructive wildfires.

BY JOSH ANISEWICZ
The ponderosa pine is a survivor. The most widely distributed pine species in North America, stretching across the western part of the continent from British Columbia to parts of Mexico, *Pinus ponderosa* has distinctively thick and aromatic bark, large bright-green needles, and prickly cones. Many of them soar over 200 feet into the air — with tall, straight, thick trunks.

Like most flora, these adaptations are beneficial. The native lands of the ponderosa pine are also home to some of the most violent and destructive recent wildfires on our planet. In 2020 alone, 52,113 wildfires burned nearly 9 million acres of land, mainly in the U.S. West — roughly 2.3 million more acres than the 10-year average and almost double the acreage burned in 2019, according to the National Interagency Fire Center.

Frequent, low-intensity fires are, in fact, essential for ponderosa pine forests and other native plant and animal species, which have adapted over millennia to survive these conditions. Over time, ground fires have burned seedlings and saplings, accumulations of pine needles, and low branches, leading to low-density, open ponderosa pine forests with few “ladder fuels” to move fires into the canopies. Fire suppression efforts, however, have reversed this trend, leading to denser stands and high fuel conditions, creating a greater propensity for stand-replacing canopy fires in which few trees survive.

Pete Caligiuri ’10 MF knows this seems paradoxical. Raging wildfires destroy acres of forests, wipe communities off the map, pollute our skies, and put animals at risk of extinction. How can fire be good?

“Frequent, extreme wildfires are a threat, but fire has to be part of the solution,” says Caligiuri, the forest strategy director for The Nature Conservancy in Oregon. “Fire always has been a part of these landscapes. Beneficial fire — like prescribed burns and managed wildfires — is essential to the long-term resilience of these forest landscapes into the future.”

But scaling up efforts to build resilient landscapes can take a long time; adaptation of species, considerably longer. Fueled in large part by our rapidly changing climate, fires are raging in places and during times of the year that are unprecedented, raising the urgency to understand the impacts increasing wildfires have on our ecosystems.

And, right now, it appears adaptation may be our best bet.

“Our human history is tied to our ability to use fire,” says Jennifer Balch ’08 PhD, associate professor of geography at the University of Colorado and director of the school’s Earth Lab. “It pervades our history, our evolution as a species. Many have forgotten how integral fire is to our human existence.”

“We can’t live without fire.”

Nearly two decades ago, Jennifer Balch was a PhD student at YSE who found herself deep in the Amazon rainforest. She was there to see what happens when you set it on fire.

Tropical rainforests do not traditionally burn, and the reason for that is right in the name. Moisture within the vegetation and the soil usually prevents any wildfires from starting or at least spreading. The fuel sources for wildfires we see in temperate forests or grasslands are usually not present.

But with drums already beating from the scientific community about the rapidly changing global climate, Balch was curious: What would happen if the Amazon burned?

Playing the role of “burn boss,” Balch led an unprecedented, experimental large-scale burn of 370 acres of forest and monitored the effects for a decade. “What we found was a closed-canopy tropical forest that turned into something vastly different,” Balch says.

At the edge of the burned area, there was “basically a grassland system,” she says. The canopy lost roughly 60% of its trees, opening a lane for native and invasive undergrowth to now thrive. Even the behavior of leaf-cutter ant colonies — which move leaf litter and other potential fuel sources — had changed.

In recent years, a combination of the changing climate and intentional burning for agricultural and mining purposes has created an exponential surge in fires in the Amazon. Brazil’s National Institute for Space Research reported that more than 39,000 fires were detected via satellite in the Amazon in 2019, a 77% increase from the previous year. The world’s most critical ecosystem, essential for the natural capture of global carbon emissions, was engulfed in flames — and the world was beginning to take notice.

“Ecosystems are already changing,” says Balch. “Humans are changing the climate and the landscapes, and we’re seeing increased fire as a result. We’re providing the ignition, with invasive vegetation doubling and tripling the amount of fire.”
Fire always has been a part of these landscapes. Beneficial fire — like prescribed burns and managed wildfires — is essential to the long-term resilience of these forest landscapes into the future.”

Pete Caligiuri ’10 MF

Today Balch focuses her research closer to home, in the American West. In a recently published paper in the journal Nature, she outlines the rise in signaling fire intensity, signaling hotter temperatures at night than during the day. This, she says, means fires are passing from day to night, losing breaks in fire intensity that are critical for those fighting wildfires.

Six years ago, Balch established Earth Lab at the University of Colorado, a data synthesis center that applies analytics to Earth systems data to make new breakthroughs and help society adapt to the changing world. A major initiative of the lab focuses on environmental extremes and natural hazards, particularly how fire regimes are changing in the U.S. Researchers are studying changes in fire seasons, the proportion of fires that are started by humans versus natural causes, the conditions in which fires occur across the U.S., and if there are predictors for large-fire events.

Their work is being quickly put to the test. In 2021, a wetter than normal spring led to above-average grass growth in Boulder County, Colorado; a warm and dry summer and fall, coupled with high winds, created the perfect conditions for a wildfire. The resulting Marshall Fire in early 2022 burned more than 6,000 acres and destroyed more than 1,000 buildings.

“Fires shouldn’t be burning in the winter,” says Balch, who has seen people close to her lose their homes to the fires. “I’ve only seen snow put out a fire once before this year — and that was last year. It just makes me ask, ‘What is going on here?’”

Balch and Earth Lab are using their experiences to sound the alarm, sharing knowledge and tools with other communities about how to create more science-informed solutions.

“There is so much at stake,” Balch says. “The science community needs to step it up; we need to stop documenting the problem and start the rallying cry. Everyone needs to do their part to get ahead of this.”

Pete Caligiuri has also had his close calls with wildfires. Located in the arid landscapes of central and southern Oregon, not far from where he grew up in Bend, he has spent a decade with The Nature Conservancy working on dry forest restoration.

“This area has all the necessary ingredients for fire,” says Caligiuri. Last year, those ingredients cooked up the devastating Bootleg Fire, which burned more than 413,000 acres of land across south central Oregon, requiring more than 2,000 firefighters to quell the blaze. It was the second largest wildfire in the U.S. in 2021, leading to poor air quality conditions as far away as New England.

The enormous fire created a real-life test for Caligiuri and his TNC colleagues, who oversee the Sycan Marsh Preserve, a 30,000-acre property in south central Oregon that features a diverse range of high-elevation marsh and dry forest habitats as well as countless ponderosa pines. The preserve is used as a “living laboratory,” allowing researchers to conduct ecologically based restoration treatments to create a more resilient ecosystem. Many of the strategies used are developed and implemented in partnership with the local Klamath Tribes, who have stewarded this sacred land for centuries.

“As the Bootleg Fire started and we saw it was headed toward the preserve, we realized we were about to learn something,” Caligiuri says. And what they have learned so far is promising: “Reintroducing fire is very important. Even under the very extreme conditions of the Bootleg Fire, we see that the reintroduction of lower-intensity fires — similar to those that have historically burned through this area — has had significant positive impact on the forest. In those places where we have successfully reintroduced fire, the forest is green and still providing habitat and ecosystem benefits.”

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While climate change is indeed a cause for the increase in wildfires,
Caligiuri points to a history of unsustainable forest management in the western U.S. for laying the groundwork for the current situation. This began, he says, with the forced removal of Indigenous peoples, followed by the introduction of domestic livestock that ate the native, grassy understories that served as a “conveyor belt for fire,” and the subsequent widespread logging of the fire-tolerant ponderosa pines. He also argues that the U.S. Forest Service’s interest in fighting lower-intensity fires throughout the 20th century has resulted in less “good fire” and created a much different landscape — dense forests full of small trees and undergrowth.

“Fire in the area was once a self-regulating process in these forests,” Caligiuri says, relying on both scientific research and Indigenous knowledge. “Now, in the unhealthy condition these dry forests are in today, we’re just waiting for the next lightning bolt or careless person to spark the next wildfire.”

Like most of the American West, much of Oregon’s 19 million acres of dry forests are under federal jurisdiction where renovation techniques are prohibited — and nearly 4 million of those acres need ecological restoration, according to TNC and the U.S. Forest Service. In response, the Sycan Marsh Preserve has become a place where researchers can test different ecological restoration treatments in hopes of creating more resilient dry forests in a way that is scalable across Oregon and the western U.S. Caligiuri says TNC’s goal is to create a base for fundamental policy changes in forest and fire management needed to create resilient, adaptable landscapes in the face of climate change. He highlights positive change taking place, including new policy in Oregon that invests in community-level efforts and infrastructure as well as the new Infrastructure Investment and Jobs Act that has made billions of dollars available to support federal land management agencies to proactively address forest resilience and wildfires.

“All of this to say: Bachmann is fully invested in the future of fire on our landscape and the role it plays in our ecosystems.

Wildfires affect every corner of the globe. They change the world we live in — and have for millennia. That wildfires are more frequent and more intense is a global concern, but not one that cannot be handled with immediate and well-managed action. The clock, however, is ticking.

“If you care about having clean water and clean air, you should care about fire. ... A burned forest is not just a scarred landscape. It affects you and the people you know. At some point or another, it will feel real for all of us.”

GRACIE BACHMANN ’23 MF
Superhuman River: Stories of the Ganga
Bidisha Banerjee (Aleph)

Physically, the Ganga River originates in the Himalayas and winds through India and Bangladesh before emptying into the Bay of Bengal, creating the world’s largest mangrove system. Mythically, the Ganga begins in the Milky Way and extends into the underworld. In this decade-long tale of adventure, Bidisha Banerjee ’10 throws away the concepts of ecology, anthropology, and spirituality to show humans trying to locate themselves in relation to what she calls a “superhuman river.” “For now, in an era of climate change,” she says, “we have the power to impact the earth and its future in ways unimaginable before.”

Bitter Shade: The Ecological Challenge of Human Consciousness
Michael R. Dove (Yale Press)

How can we achieve sufficient distance from our own everyday realities to think and act more sustainably? In this anthropological book, Michael Dove, Margaret K. Munner Professor of Social Biology at Yale, leans on his extensive research in South and Southeast Asia on how local cultures have approached the “arts of consciousness” — the paradox that we cannot completely comprehend the ecosystem of which we are a part. Dove highlights three transcending principles: perspective, or how we see oneself from outside oneself; metasynthesis, or how to become something that we are not; and metamnesis, or how we copy something we are not.

Forensic Forestry: A Guidebook for Foresters on the Witness Stand
Robert P. Latham (CRC Press)

Now a semi-retired professional forester and economist, Robert Latham ’83 MF relied on decades of experience to pen this unique hands-on resource for foresters and land use professionals called upon to work on legal cases and testify in court. These issues, particularly in the U.S., are becoming increasingly important — and contentious — and require considerable knowledge of the legal system in addition to technical expertise of our forelands. Written for those who serve as expert witnesses or consultants to attorneys, the book also outlines real-world case studies that describe evidence used in legal proceedings and the testimony that was provided.

Split Waters: The Idea of Water Conflicts
Edited by Luisa Cortesi and K.J. Jay (Routledge)

This collection of essays, co-edited by Luisa Cortesi ’18 PhD, investigates consumer narratives about water scarcity to make readers rethink water conflicts and how they are commonly understood and managed. Using case studies from around the world, “Split Waters” goes in-depth on how water conflicts begin and who is involved, finding deeper meaning to create alternative agendas that change the conversations among scholars and activists. Cortesi has received numerous awards for her research on water systems, including the 2019 Theron Rockwell Field Prize, a prestigious Yale-wide award that honors scholarship of poetic, literary, or religious value.

Biodiversity Islands: Strategies for Conservation in Human-Dominated Environments
Edited by Florencia Montagnini (Springs)

Florencia Montagnini, a senior research scientist and director of the program in tropical forestry and agroforestry at YSE, has written a dozen books and more than 250 articles about the ecology of tropical forests, agroforestry, and native species and forest landscape restoration. Her latest work provides an overview of the identification and establishment of “biodiversity islands” — sections of land where plants and animals thrive without human interruption. The book — intended for a wide range of people, from farmers to land managers to policymakers — presents real-world examples of successful biodiversity islands and offers design parameters for siting and spatial distribution for effective conservation and regeneration.
EXPLORING THE DEPTHS OF WATER’S ROLE IN CLIMATE CHANGE

Aquatic ecosystems play an essential role in the greenhouse gas emissions cycle. Water bodies can sequester carbon and they can also release emissions. Reducing these emissions and exploring ways of increasing their potential for carbon uptake is at the center of new climate research at YSE.

BY FRAN SILVERMAN
COVERING NEARLY THREE-QUARTERS OF THE EARTH, SURFACE WATER PLAYS A CRITICAL ROLE IN THE CARBON CYCLE OF THE PLANET BY STORING AND ALSO EMITTING GREENHOUSE GASES, BUT EXACTLY HOW MUCH OF A ROLE IT PLAYS AND ITS POTENTIAL TO HELP MITIGATE CLIMATE CHANGE IS STILL A QUESTION.

To get answers, Yale School of the Environment researchers are calculating the amounts of greenhouse gas emissions that different water bodies emit into the atmosphere, factors that influence and could mitigate these emissions, and the potential of blue carbon — oceans and coastal ecosystems — to sequester carbon. In the past two years, Ben Gergen ’22 MESc has been chest deep in mud at the Yale Nature Preserve to create buckets of mud to test methods for reducing emissions.

In Vermont’s Northeast Kingdom, YSE Professor Peter Raymond and Jim Saiers, joined by their colleague Yale Associate Professors Peter Raymond and Jim Saiers, are working together with a team of students to spread crushed rocks on a watershed. And in the southern U.S., Jonathan Gewirtzman, PhD student, and Francie Adams ’23 MESc are measuring carbon uptake. Laura Logozzo has been taking samples from water bodies in Connecticut to examine dissolved carbon and vacuum line in a river over time.

It is not just how much carbon and other greenhouse gases are being emitted and stored by water bodies that have the attention of YSE researchers. It is also the age of dissolved carbon in water bodies. PhD student Laura Logozzo has been taking samples from the Connecticut River to ascertain the age of dissolved organic carbon. For the past two years, she has taken samples from five different areas along its span to do what has not been done before: focus on the age of dissolved organic carbon in a river over time.

What she has found from her samples — and older ones stored in the lab dating back more than five years — has raised a possibly troubling issue that needs further inquiry: Dissolved organic carbon found in the river samples is significantly older than previous samples.

“This means that the amount of old carbon compared to fresh carbon entering the river is increasing,” she says.

If a river has older dissolved organic carbon present, it means that the carbon once stored in terrestrial soils and forests has been entering the river and could be a new source of carbon dioxide being released into the atmosphere. While research has not yet determined the cause of the presence of older dissolved carbon in the river, it could be a result of droughts caused by climate change. The urbanization of watersheds and agricultural use could also cause the dredging up of older carbon soil pools that are then exposed and washed into rivers.

And that’s bad because you’re basically losing whatever carbon is stored on land,” explains Logozzo. “If you’re not measuring the carbon that’s actually leaving those soils into rivers, then you may be overestimating how good these ecosystems are at storing carbon.”

THE EMISSIONS FACTOR

At world leaders seek to keep global warming to 1.5 degrees Celsius over preindustrial times to avoid the most devastating and widespread impacts of climate change, deepening our understanding of how much the emissions of water bodies contribute to the global budget has become an increasing focus of the international scientific community.

Up until 10 years ago, there was no definitive count of the full surface area of water bodies on the planet. In 2013, Raymond and colleagues developed the first global map of their surface area and carbon emissions. They found that water bodies are emitting 2 billion tons of carbon as CO2 each year, each year. Their report, published in the journal Nature and cited as one of Raymond’s most cited research studies, prompted further inquiry into anthropogenic emissions and fluxes.

“It’s mostly part of the natural process, not like fossil fuels emissions,” says Raymond, professor of ecosystem ecology, whose undergraduate research work focused on carbon dioxide emissions in the Hudson River. “But when you are trying to figure out how much anthropogenic emissions are and fluxes in different regions, it becomes important to know, and it’s a number that is big enough to be considered in global modeling of atmosphere CO2.”

YALE SCHOOL OF THE ENVIRONMENT SPOTLIGHT ON YSE RESEARCHERS

Jonathan Gewirtzman with A photooxidation chamber in a river.

Laura Logozzo has been taking samples from water bodies in Connecticut to examine dissolved carbon and other measurements relating to water quality. Here she is performing maintenance on water quality probes in the Connecticut River.

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Yale News is featuring the work of several YSE researchers working on two key projects involving water ecosystems: reducing emissions and increasing carbon uptake.

Previous page: PhD student Jonathan Gewirtzman uses a photooxidation chamber in the Florida Everglades to examine dissolved carbon and other measurements relating to water quality.

Laura Logozzo has been taking samples from water bodies in Connecticut to examine dissolved carbon and other measurements relating to water quality.

Previous page: PhD student Jonathan Gewirtzman uses a photooxidation chamber in the Florida Everglades to examine dissolved carbon and other measurements relating to water quality.
Human-impacted aquatic ecosystems and wetlands — including inland, coastal, and oceanic systems. The combined emissions from these aquatic ecosystems are potentially a larger source of methane than direct anthropogenic methane sources, such as agriculture or fossil fuel combustion. The amount emitted from these aquatic ecosystems is also impacted by human activity and is important to track, the study notes.

\*Taylor Maavara, a YSE postdoctoral fellow, has been exploring a unique area of study: how dams, a key component of hydroelectric power, affect nitrous oxide and other greenhouse gas emissions. In the coming years, almost 90% of the Earth’s rivers will have dams. And while they provide less carbon-intensive sources of energy at the point of generation, hydroelectric dams impact water body emissions in significant ways. “There are potentially up to 70,000 medium-to-large reservoirs on Earth. And if you’re trying to extrapolate the amounts of emissions from just the 50 reservoirs that have been studied, there’s just massive uncertainty,” she says.

\*Her research has focused on, among other things, how much nitrous oxide is emitted from reservoirs, rivers, lakes, and estuaries — and it is high. “Inland waters are emitting roughly the same amount of nitrous oxide as a country in Europe,” that’s a significant amount, Maavara says. “Another finding was that reservoirs were the most efficient inland water emitters. As we continue to dam, we’re going to potentially increase the emission of nitrous oxide from inland water sources.”

\*To mitigate this, she advocates for pulling back from the notion that dams must have a timeline. And after a certain point, they should be decommissioned and deconstructed,” she says.

The degradation and clearing of coastal ecosystems cause emissions of between 0.15 and 1.02 billion tons of carbon dioxide into the atmosphere each year, according to the study “Estimating Global ‘Blue Carbon’ Emissions from Conversions and Degradation of Vegetated Coastal Ecosystems” published in PLOS ONE. These emissions are equivalent to 3%–19% of those from deforestation globally, the study notes.

Yet only about 1.5% of global BCEs are currently included in marine protection areas. Preserving, managing, and restoring these ecosystems globally, alongside seaweed farming, could reduce emissions by as much as 1.4 billion tons of CO₂ equivalent emissions annually by 2050, according to a 2019 High Level Panel for a Sustainable Ocean Economy report.

Quantifying the potential BCEs have for carbon storage and how to maximize it is the focus of several new field experiments being carried out by YSE researchers.

Raymond’s lab will be using a new Swiss-built instrument the size of a small car to calculate timelines of blue carbon sequestration cycles from samples he hopes to gather with partners from water bodies all over the world. This will enable researchers to better understand the sequestration process and ways to enhance it, Raymond says.

The term “blue carbon” was first coined in 2009 as a nod to the potential of these ecosystems that store carbon to help limit the global average temperature rise to well below 2 degrees Celsius — an atmospheric tipping point. Blue carbon ecosystems (BCEs), which include salt marshes, mangroves, and seagrasses, each sequester more carbon per hectare per year than tropical forests.

The research will help quantify the potential of blue carbon ecosystems, helping to inform ecosystem conservation and management, climate modeling, and the carbon credit marketplace.

“We’re trying to get a sense of what the vulnerability is of carbon stored in these systems to a changing climate,” Gewirtzman says.

Mangroves are among the most carbon-rich forests in the tropics, but in the past 50 years, between 30%–50% of mangroves have been lost globally, according to the Blue Carbon Initiative.

“The work we are doing, we’ll be able to have a better assessment of precisely how influential mangroves are as a blue carbon sink,” says Adams. “I think one of the most exciting findings would be if the restored sites and the undisturbed sites are doing significantly better than the disturbed sites. Then we could make a stronger case for restoration and protection of mangroves.”

NOT JUST ABOUT CARBON

YSE researchers are examining methane and nitrous oxide emissions. While it only persists in the atmosphere for a dozen or so years, methane traps heat far more effectively than carbon dioxide and accounts for 25% of atmospheric warming in the industrial era. Nitrous oxide molecules are roughly 300 times as effective in warming than carbon dioxide molecules and, unlike methane, can persist in the atmosphere for over a century. Last spring, a study by a team of researchers led by postdoctoral associate Judith Rosentreter and co-authored by Raymond, found that dams impact water body emissions in significant ways.

Taylor Maavara, a YSE postdoctoral fellow, has been exploring a unique area of study: how dams, a key component of hydroelectric power, affect nitrous oxide and other greenhouse gas emissions. In the coming years, almost 90% of the Earth’s rivers will have dams. And while they provide less carbon-intensive sources of energy at the point of generation, hydroelectric dams impact water body emissions in significant ways. “There are potentially up to 70,000 medium-to-large reservoirs on Earth. And if you’re trying to extrapolate the amounts of emissions from just the 50 reservoirs that have been studied, there’s just massive uncertainty,” she says.

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To mitigate this, she advocates for pulling back from the notion that dams must have a timeline. And after a certain point, they should be decommissioned and deconstructed,” she says.

THE PROMISE OF BLUE CARBON

While water bodies are sources of emissions, whether human induced or from natural cycling, they also store carbon at levels that show promise as a natural climate solution.

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MIGRATING SALT MARSHES

Shumon Banfield, Vernon Letters and research scientist in water resources and environmental chemistry, has been tracking the impact of climate change on salt marshes, which store carbon in peat. Sea level rise has
been a main pressure on coastal salt marshes, which can lead to their collapse and the release of carbon.

“I fear that in 50 years, with accelerating sea level rise, a lot of our marshes will disappear,” Anisfeld says.

His studies show the need for planning for marsh migration to protect them so they can continue to store carbon and be a natural buffer against storms. This means less development in coastal areas, where homes often abut salt marshes.

“We need to plan around marsh migration corridors and leave room for them,” he says.

Another promising area of research being explored at YSE is the reduction of biological methane emissions. This is because the iron reduction pathway gives microorganisms more energy.

So far, the addition of iron worked — in the lab buckets at least, says Girgenti, who regularly tested the air through an intricately designed closed chamber he constructed himself to obtain the methane readings. “It is a very quick response where the production of methane is just shut off,” he says.

The hope is to transfer that success to natural wetlands.

ENHANCING CARBON UPTAKE

In Vermont this spring, Jim Saier, working with Raymond and Planavsky, is overseeing a team spreading crushed basalt to a pasture with a stream running through it to examine enhanced weathering in a watershed. Weathering happens when rainwater and snowmelt interact with rocks and soil and dissolve minerals, and carbon dioxide is converted to bicarbonate, which sequesters the carbon dioxide and removes it from the atmosphere.

“Lowering greenhouse gas emissions is paramount, but we will also need to capture carbon dioxide from the atmosphere to achieve climate stabilization targets. Enhanced mineral weathering may be among the practical instruments of CO2 removal,” says Saier, who is Clifton R. Musser Professor of Hydrology. This is one of the first times this type of enhanced natural weathering process will be tested at the watershed scale, he says.

Saiers says, “It can be part of the solution, but it isn’t going to solve it,” says Saier. “It’s one tool in the toolbox, but it can’t be a substitute for lowering emissions.”

All this YSE research will help get a firm handle on emissions and absorption of greenhouse gases by water bodies, how important this is for the global budgets, and how we might manage these systems to mitigate net emissions — information that could prove invaluable as the window to avoid the most severe impacts of climate change closes.

“We need to plan ahead on converting basalt,” and which types of rocks are most effective in speeding up chemical weathering, says Saiers. “It is too soon to tell if the addition of the basalt to some of his mini mesocosms. However, chemical weathering takes time, so it is too soon to tell if the addition of the basalt is working.

“We need to plan around marsh migration corridors and leave room for them, “ he says.

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COMMENCEMENT
2022
Students from the YSE Classes of 2020 and 2021 returned to campus May 14 for a special in-person commencement ceremony, and the Class of 2022 commencement was held May 23. The events included a celebration in Kroon Courtyard that featured food, photos, and festivities. View the ceremonies: environment.yale.edu/commencement

Congratulations to the Class of 2022!
Many of the close to 200 graduates who make up this year’s class — joined by nine canine companions — gathered behind Marsh Hall bright and early on April 5 for the 2022 class photo. A makeup photo was taken later for those who could not make it on the 5th and is posted on the YSE website at https://yse.to/2022. The photo also will hang on the wall of the Sage Hall staircase with photos of previous graduating classes.
Absolutely wonderful stories written by the guys working 1900-1950. Living conditions. Their life, their work, their development, their personal development, their life as a forest supervisor in a logging area, their life as a logging supervisor, their life as a forester. It was assumed I could name 10 different species. I know these are by memory mostly from Asia, Europe, and America. My career: five years in Northern California (redwood lumber, actually), 25 years in Washington, D.C., and Geneva, Switzerland (foreign trade, tariffs, and displays not just trade of goods and commerce, but also people). The rest in New Hampshire managing my own forestland, trading foreign marketing at Kenne State, and volunteering with environmental organizations (forests, birds, lakes).

Denotes a reunion class year. Reunion 2022 will be held October 7–9, 2022.

Richard Bury writes: “I think I’ve gotten to where my life is not about me anymore — it’s about my wife and family and friends and people around me.”

John Blouch writes: “Reconnected with Jan Revilla ’94, 78 PhD, cabinetmaker at Crowell in spring of 1994. Related wood-working brought a 30% increase in offers for timber on the wood lot, but shifting management focus toward aesthetic value happens, this will be my legacy to the Filipino people and humankind!”

Ron Wilson writes: “I enjoy living like a semiretired forester working part time for a medium-sized plantation company with head office only one suburb away from where I live in Sydney. I enjoy the E-bike to work. The major fires of 2019–2020 had major impact on our company as around 30% of our softwood plantations were burned. Fortunately, most conserved a lot of extra work in sorting out replanting/rehabilitation and other tools. A highlight of 2021 was a trip to the U.S., which was a real challenge here. I am currently involved in
policy with colleagues to attempt to get more plantations established in Australia, for many good reasons. Other interested: DaveHallFineArt.com. I retired in 2017 after 39 years teaching at the University of Maine in the greater Yellowstone ecosystem. If you're interested: DaveHallFineArt.com.

Dave Hall ‘77 on Idaho’s Henrys Fork of the Snake River.

Andrew McIvorwitz writes: "Still in Louisville. Will mark two years of retirement in April by marrying off our daughter, Continue to do consulting (paid and unpaid) for utility regulators in emerging economies. Managed to escape some travel into the Delta-Omniex gap and look forward to getting out more in 2022. Keeping busy with teaching—introduction courses through the local public library and the park system founded by Dan Jones '06.'
New England emissions over the next 30 years by establishing reserves, changing forestry practices to Exemplary Forestland standards, and building tall buildings with wood instead of concrete and steel. Professor Brad Geary's students at the School helped us pull a policy initiative together. We look forward to seeing upcoming reports from Highwood Foundation and the University of Maine to support our conclusions, and then we’ll attempt to direct climate funding toward financial resources for landowners and builders to make this.

Jane Sokolow: "Early 2022 finds me in very different circumstances from early 2021. We are much harder hit down presently in Rivendell but managing to get up to our old farm in the 11th year of the turbine. Both Neil and I are active on several boards – me on the Bronc Council for Environmental Quality and The Natural Areas Conservancy of NYC and Neil on The Cary Institute and a faith. I am supposed to be on the planning committee for my 50th reunion from college, but it remains unclear if the event will happen in person. We made a 50th reunion from college, but it remains unclear if the event will happen in person. We made a
day trip to Pennsylvania in May, where the family gathered to decorate a bench and native plants to meet our project goals. I am grateful for the fact that my late brother, Paul, who was a Maine Literary Awards finalist for the short story collection ‘Common Cause and Other Poems. ’

Elizabeth Swain (1948–2020), on the headwaters of the Eel River in California, to my late brother, Paul, who was a Maine Literary Awards finalist for the short story collection ‘Common Cause and Other Poems. ’

Chris Stocker and April Grimm write: “We are living the Sierra foothills of Northern California and are both celebrating our retirements (Chris from telecom, April from the solar industry). We have two adventurous sons in their 30s who work in tech. We still miss our Jessie, born when we were at Yale, to this day. With travel becoming more feasible, we plan to visit part of the U.S. and Canada with our 16-ft sailboat doing bicycle we see some of you on the road. Thanks, Theresa and Joe.”

Chris Donnelly writes: “After working for the German government in Berlin as director general of forests, sustainability, and renewable resources of the Federal Ministry of Food and Agriculture for the past three years, I have recently retired and have just moved back to Italy. I am also active as ever in wilderness travel, hunting, sailing, and skiing in the Alps, accompanied by my faithful mutt, Walker.”

David Loeks ’83 and his dog, Walker, in the Yukon. David Loeks writes: “Greetings from 50% of the world. We are still wade through a pond nearby to count wood frogs since 1991 of seeing our two daughters evolve to work in global health and international conflict. I’ve enjoyed seeing classmates David Millocken, Chamberlain, Eric Carlson, Nels Johnson, Rob Ramsey, and Laura Brown regularly. And so the social distancing means. Best wishes to all!”

Jeff Burley ’65 writes: “I am doing tech at the expense of wise planning. Sadly, the elusive bluefish in Long Island Sound in one of those things I wonder if we will ever rise. I am getting rewarded enormously by being involved father of our wonderful special needs son. My wife and I are Marie Wadsworth, and God is kind.”

Eva Mueller writes: “After working for the Newseum building on Pennsylvania Avenue for its active in wilderness travel, hunting, sailing, and skiing in the Alps, accompanied by my faithful mutt, Walker.”

Ken Andrasko writes: “At almost age 80, I have a favorite close-to-home mountain biking area. Jerusalem is my favorite city and Canada with our 16-foot trailer in tow. Maybe the wheel spins. Best wishes to all!”

Jonathan W. Nute, nuteanne238@gmail.com

Mary Brown, salserad@yahoo.com

Anne Buckelew, anne.buckelew@gmail.com

Daniel Hellerstein writes: “At almost age 80, I have a favorite close-to-home mountain biking area. Jerusalem is my favorite city and Canada with our 16-foot trailer in tow. Maybe the wheel spins. Best wishes to all!”

Yoel Seton ‘87 and his family visited San Francisco last year.

Diane Stark, salserad@yahoo.com

Joshua L. Royte, jroyte@tnc.org

Yoel Seton: “If I were a book, I would have been rewarded enormously by being involved father of our wonderful special needs son. My wife and I are Marie Wadsworth, and God is kind.”

Eric Carlson, eric.carlson@yse耶鲁大学的环境科学系

Yale School of the Environment

Let us know how you are doing! alumsæ@yse耶鲁大学的环境科学系

Canopy Spring 2022 85
on May 31. Missing from most maritime histories of America first is the raging fest of pestilence that swept through the 40-man-crew ships—this war, it truly revealed the new nation’s character—above all, its ambitious and entrepreneurial ethos. ‘Rebels at Sea’ corrects that. Both on land and in the seas, the ability of privateers to flourish was a testament to the strength of the American economy. It was an era of private property, and the resulting economic growth and productivity were the foundation of the nation’s future. We should forget retirement; get back in the streets. Contact contractors to work faster. Time is a-wasting; technological and infrastructural makeovers in the near future can help us rebuild and grow.

Then I go to work, making this vicious virus, then my family, then my friends, all in continuous tribal warfare, then the victims of the Indigenous people, then the people persecuted by our own society, then their species of plants and animals except humans, then because the list of things we have to hold in our heads is just too much. And then I move on to what else, to what else? With no symptoms. I wish you well. The architect forgot to enforce the laws of nature. That beautiful building simply doesn’t work anymore. I wish the architects had been given some new laws to work with. It is a MoMA vision, but somehow by design.

In my life, I have pushed beyond my own environmentalism into the deeper waters of another realm of impact. I am working to make the world a better place with a more working alliance among environmentalists. I am saying that we are all in this together, and we need to work together to make a change. It is a cold upstream wave. I miss the neatness, the leaf architecture, and laying out new species. It is a classic upstream wave. I miss the neatness, the leaf architecture, and laying out new species. It is a very cold wave. Sometimes we need to reorganize and think about what we are doing and what climate accountability is. I wish the architect had been given some new laws to work with. It is a MoMA vision, but somehow by design.

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CLASS NOTES

Jane Whitcomb writes: “Freelance writing in drug development continues to be productive — always new diseases, new treatments, and new learning to learn about. And (about time!) people are including the physical and social environments that encourage health (or that discourage health).”

95 CLASS VOLUNTEERS

96 CLASS VOLUNTEERS

97 CLASS VOLUNTEERS

98 YALE SCHOOL OF THE ENVIRONMENT

99 CLASS VOLUNTEERS

99 CLASS VOLUNTEERS

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Indigenous peoples, and local communities across Asia and the Pacific. With climate action concerns becoming more urgent, scaling up our work is imperative. Ideally, RECOFTC will continue to grow and provide even stronger services to the Asia-Pacific, especially IPECS and marginalized peoples. For addressing these challenges, I hope to have talented people on board to help us in the years to come. If interested, please do not hesitate to contact me or visit the website at rocfo@se.alumnifire.com.

David Ganz ’96 (center) presenting social forestry trends of the 21st century at a workshop on Social Forestry and Climate Change in Jakarta.

A quilt made by Julie (Herbst) Bain ’99, titled “Unloved Insects of Nebraska.”

Avery Anderson ’08 writes: “I am the chirpy antichrist of my closest friends. I hope everyone is well.”

Juan Brewer writes: “I am the dimpy antichrist of the South Island high country of New Zealand. Having discovered that the government land reform is now selling land at negative rates that land sold for 992 times the government selling price, on average, the farmers call me a socialist infection, and开玩笑 me call the dimpy antichrist. My studies call me professor of environ science at University of Canterbury in Christchurch. And yes, there is a bill already close to passing through Parliament to finally, at very last long, end the land reforms.”

Maria Ivanova writes: “Global environmental protection is my passion during my time as an MSEM student (joint with international relations) and turned into an academic career after receiving a PhD in 2006. I joined UMass as

A quilt made by Chris (Herbst) Bain ’99, titled “Unloved Insects of Nebraska.”

A quilt made by Julie (Herbst) Bain ’99, titled “Unloved Insects of Nebraska.”

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CLASS NOTES

Boston in 2010 to create a new PhD program on global governance and human security (global-amb.org). I also teach a course for a group of amazing YALE women (all PhDs in the program) on the book Jane Rule ‘83 (now professor at the University of Georgia) and I organized a conference for her in 2019. At Marinus Campus ‘06, Christine Ehrenberg ‘05, Eva Garon ‘05, Kelsey Maxwell ‘04, and Helen Pond ‘02 discussed their career trajectories and making graduate students in Georgia and Massachusetts—also discussing the EMSC (Environmental Storytelling of the World’s Leading Environmental Institutions) conference. I am happy to be in Pers in 2021. Now off to the U.N. Environment Assembly and UNEEG/50 commemoration in Nairobi! And now we are going international through “Women by Any Means” of Anne Perkins, a fantastic book about Yale's 1971 and UConn’s Women’s basketball team, US Women's basketball. Let us know how you are doing!

In addition, our summer road trip to New Mexico included a visit to the Albuquerque Botanical Garden, a trip to the Baja, and a visit to the Borrego Desert, Catalina Island, and San Francisco. Sylvia (Stone) Busby ‘01 writes: “I am currently the CEO and partner in ULTERRE, which is a residential and commercial real estate business in Dallas/Fort Worth. We are doing our best to manage the flow of people to Texas. Please come see us. Margaretta on and Dawn, P.S. Our boys are off to college, so it’s just us and the girls now. Janie and Georgia.”

Adj (Alane) Morgan ‘02 writes: “Hello! I am happy to report that my family and I have stayed home from school since March 2020, and in 2022, I hope to be working on a book about women in American Values and Ethics. Our organization is going strong, and there is still much work to be done since our victory in November 2020. I also serve on three other non-profit boards, including as a term of St. Margaret’s Episcopal School in Maryland. My husband, Lindsay, and I also celebrated our 15th wedding anniversary in July 2022, and we can’t believe that our first child, Grace (14), will be in upper school in the fall. Our second son, Jackson (12), started his middle school career last year. We are also parents to our dogs, Sage and Auggie.”

Harry White ‘09 writes: “I’ve been working on large-scale preservation projects in New Mexico and have most recently saving 10,000 acres in the High Plate and Mauhake regions of western New Mexico from clear-cuts and other forest industry-related activities against nature. I also recently joined the Science and Technology Working Group of the Connecticut Governor’s Council on Climate Change, where we went up against science-denying forest interests, including YALE faculty, and I also serve on the state’s Wildlife Management Advisory Group, where we are trying to prevent the killing of bears and apex predators. I am hoping to refer to my paid work and spending more time on the 600+ dwarf conifers I have in containers and bonus cultivation here on the farm in northeastern Connecticut. Blessings to all.”

Dave Illou ‘02 writes: “I’ve transitioned into a full-time deans role at Warren Wilson College, overseeing all land and sustainability programming. I still get into the wood works with students on our agroecology program. I hope to see you in 2022.”

Catherine Bottrill ‘97 writes: “I am now the office legal and program officer for the conservation at the American Forest Foundation — I have met such amazing friends there with whom I am working on citizen science. Because the foodway I am focusing on fermentation, I have been eating and making lots of pickles (‘tsukemono’). I hope to return to the park as soon as the lockdown allows it.”

Rachel N. Novick ‘03 writes: “I am currently a sustainability at Morton Arboretum.”

Rachel Novick ‘03 and her husband, Peggy, on Lake Fontana, North Carolina.
Jeff Sigler writes: "After graduating in 2004, I did air-quality research in New Hampshire and then spent nearly a decade as a professor of practice in Earth sciences at Tufts University in New Orleans. Recently, my wife (Veronika) and I decided to return to Connecticut to be closer to our family. We are living in Hartford with our son, Killian (10), along with (or is my knowledge) five cats, one dog, and two rabbits. I am teaching environmental science, chemistry, and climatology at Wadsworth School."

Tamar Meir-Amitzcea writes: "For the past two years, I have been working as creative director of our Israeli Great Mountain Forest and had the privilege to meet the incoming YSE students. I left this position and moved to New Jersey and after many years of encouragement from my YSE family, I started a process in order to have my father recognized as a victim of a human rights violation. I am also a proud mom of my 3-year-old son.

Elizabeth Pickett writes: "This year will mark 53 years at Hawai’i Wildlife Management Organization, a dream come true for me. Over that time, I have become a hub of all things wildlife in our Hawai’i Pacific region. Since these first impacts from storms, larvae, hoover wasps, and commotion, and the fact that fire issues require different partnerships and lots of different people in many sources and geographic areas, I continue to love facilitating collaborative projects that protect both people and place, made better only by the fun and capable team we have. On the home front, my son is 6 and loves hunting, surfing, watching insects and reptiles, and playing with our chickens, ducks, and dog. Our bamboo and beaches are really producing this last day: winter visit and winter with us!"

Derrick Deane writes: "Happy New Year! I finally remembered to update our records. But a whole lot to tell ... still living in Denver and doing environmental compliance work for a consent and aggregate reporting company. I used to want to be a lawyer but I am glad I am not. I am a 2008 grad. Let's talk."

Charlie Lin writes: "Married with two kids in Cambridge, Massachusetts, these days — say hi if in town. Hobbies now involve kids topknots, kids doodling, kids — you get the idea. Also doing a local background job here: fruitplummet.com.

Brandon (Berkley) Miduraah writes: "I am now living and working in Washington, D.C. as the environmental Innovation Program of sustainable improvements in decarbonization startups and projects. My husband, Mark, and I recently welcomed our second baby boy and are enjoying life as a family of four. In the past year we enjoyed camping and hiking with friend Yuki Yoshida and other family and friends."

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PJM Interconnection’s electricity markets in the past few years have seen a surge in renewable energy, leading to several projects and initiatives aimed at reducing carbon emissions and promoting sustainable practices. This is particularly evident in areas such as the Midwest, where the company has been working on several renewable energy projects, including the development of large-scale solar and wind farms. These initiatives are part of the broader effort to transition to a low-carbon economy, which is becoming increasingly important in the wake of the climate crisis. In this context, PJM Interconnection is playing a crucial role in shaping the future of the electricity sector, leveraging technology and innovation to drive a more sustainable and efficient energy system.
Mikael Cejtin writes: “After Yale, Alex Draper ‘16 YSN and I recently moved in to the most part of New York’s north of the Adirondacks. In 2016, I moved to Albany in order to work at the New York State Department of Environmental Conservation. I am now working for the Department of Environmental Conservation as a Community Liaison, where I get to work with fellow YSE volunteers to collect data on seven invasive species for the state of Massachusetts, volunteers will be leading the charge to remove as many of the invasive species as possible.”

Kevin Ogorzalek ‘07 writes: “I miss F&ES/YSE every day and keep in touch with alumni all over the world. I am happy to report that my work causes me to regularly bump into YSE colleagues. There are many ways to stay involved, just a couple of fun examples: Tristane Davis ‘16 and I step up in Luxembourg on sustainable packaging work (and definitely went out for drinks afterwards). Kevin Ogorzalek ‘07 has been an amazing mentor and friend and I am so grateful for her guidance and support.”

Jeremy Menkhaus writes: “Hi! I live in New Haven with my partner, Kristin, and almost 4-year-old son, Ellison. That’s how long you have been out of school: Ellison is going to be 4. I do market engagement for the Connecticut Green Bank’s commercial and multifamily lending programs. In 2022, I expect to graduate from the Financing and Deploying Clean Energy certificate program at Yale. I also serve on the board of Common Ground High School in New Haven and Operation Fuel, a non-profit helping people pay their heating bills. Come and say hey when you visit New Haven!”

Thomas (Launer) Nygaard writes: “I will legally change my last name to my mom’s family’s name, the Nygaards, in a few months (I am legally changing my last name to my mom’s family’s name, the Nygaards, in a few months). That’s all I have, I will see if I am in your class, but I will see if I am in your class, but I will see if I am in your class...”

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Jessica Wilder, jess.wilder@yale.edu

Sarah Jill Graham, sarahjill.graham@yale.edu

Michelle Duggan, michelleduggan@pinterest.com

Samantha Chadha mentions: “Half of the time I dream of having my son be the prime minister of India, and the other half I plan how I myself can be a part of it. I am in the process of planning a fundraising event (with some sneaky, as it were, to see if Zoom-doom is over and I will see the light of day in Kroon!”

Let us know how you are doing: alumni@yse.yale.edu
IN MEMORIAM

Thomas E. Lovejoy
'63 BA, '71 PhD
(1941–2021)

Conservation biologist Thomas E. Lovejoy ’63 BA, ’71 PhD, known for his decades-long field research on deforestation in the Amazon, inventing “debt for nature” swaps, and promoting the term “biological diversity,” died December 25, 2021, at his home in McLean, Virginia. He was 80.

Lovejoy’s commitment to reducing deforestation and its impacts on plants and animals and his work to call attention to the concept that an increase in carbon dioxide would lead to global temperature increases put him at the forefront of some of the most important issues facing humanity in the 20th and 21st centuries.

Lovejoy studied biology at Yale and was a longtime member of the YSE Leadership Council. He also served as an assistant at Yale’s Peabody Museum of Natural History and as an advisory board member of the Yale Institute for Biospheric Studies. He held several highly visible positions at leading NGOs, including chief biodiversity advisor for the environment for the World Bank, assistant secretary at the Smithsonian Institute, and executive vice president of the World Wildlife Fund. In April, Lovejoy received the National Geographic Society’s 2022 Hubbard Medal posthumously. The award recognizes Lovejoy’s “extraordinary contribution to conservation biology and understanding and protection of the Amazon.”

“Tom was an amazing role model. He was a scholar with real-world impact in not only advancing — even creating — a field but also working in complex diplomacy with governments to advance conservation and reduce deforestation,” says VSE Dean Indy Burke. “He believed with all his heart that each of us could make a difference with our science and with our diplomatic and empathetic advocacy. He was an eternal optimist despite what he witnessed. I’ll always remember his chival smile.”

YSE Oastler Professor of Population and Community Ecology Os Schmitz says that while Lovejoy’s research findings were sobering, he was never discouraged.

“Tom Lovejoy was that rare breed of scientist who had multifaceted capabilities. He not only had the capacity for deep, technical scientific thinking and analysis but also the ability to step back and distill that technical knowledge in ways that helped solve environmental problems,” Schmitz says. “He was a genuine and caring colleague and an excellent mentor to young scientists aspiring to assume their own careers at the nexus of scientific research and application. He made our world a better place in which to live.”

Friend and colleague Alexander Brash ’85 MFS, who worked with Lovejoy at WWF, says Lovejoy was able to give voice to conservation by bringing the issue to the attention of influential and politically connected people.

“Tom ever danced on the edge of politics and science, even inventing the notion of nature-for-debt swaps in the 1980s as a way for wealthy nations to fund nature preserves in developing countries — an idea that has been revisited in the form of carbon tax credits.”

ALEXANDER BRASH ’85 MFS
Allen U. Reddi ’66 MF (1938–2022) passed away on January 3, 2022. He was born and raised in Louisiana and earned his BSF degree from the LSU School of Forestry in 1960. Upon graduation, he was employed by Fordyce Lumber Company in Arkansas, where he met and married his wife, Lou. He took a year off to study forestry at the University of Washington before joining the U.S. Forest Service lookout in Montana. There, he developed skills that would later serve him well in his career in forestry. In 1956, he was drafted by the Army and served as a service forester stationed at Yellowstone National Park, Pinnacles National Monument in California, and the Western Forestry Center in Portland, Oregon. He also worked as a service forester for the Royal College of Forestry in Sweden and consulted with private landowners on timber management and environmental protection. In 1977, Don moved to Roanoke, Virginia, with his wife, attorney Tonita (“Toni”) Minge Foster, and helped to drive a shift in viewpoint away from a focus on forest protection. In 1988, he joined the North American Land Trust, a land conservation group that has worked on more than 2,500 projects in 23 states involving more than 136,000 acres of protected land. Since 1977, he has been a prominent conservationist, residing in Chadds Ford, Pennsylvania. In 1953, while attending a Boy Scout Jamboree in Irvine, California, the then-16-year-old encountered organizations dedicated to natural resources and conservation, which became his passion. He served as executive director of the Brandywine Conservancy during its formative years from 1970 to 1976, during which he oversaw the renovation of the old mill building that became the Brandywine River Museum. He was president of the Natural Lands Trust from 1979 to 1988 and went on to found the American Land Trust, serving as its president until he retired in 2015. The nonprofit NALT—a land conservation group that has worked on more than 350 projects in 23 states involving more than 136,000 acres of protected land—was Andrew’s crowning professional achievement. Andrew had a keen sense of business and what would motivate people to do the right, charitable thing; he saw things from different angles and would come up with creative solutions.
William I. Stein ’52 MF, ’63 PhD (1922–2021) was born July 22, 1922, in Wurzburg, Germany, and died nearly 99 years later in Corvallis, Oregon, on June 28, 2021. In early 1920, after managing a large farm near Flandreau, his family sought a milder climate and purchased a 54-acre farm north of Dunder, Oregon. He attended Pacific College in Newberg, Oregon, and was awarded a BS in 1943. He was drafted in May 1943 and, then, enabled by the GI Bill, he completed a bachelor’s in forestry at Oregon State College in 1948. He earned his master’s and PhD at YSE. As a junior forester with the USDA Forest Service in Seneca, Oregon, he marked trees for harvest. He then transferred to the Wind River Experimental Forest near Carson, Washington, where he began a 41-year research career with the Pacific Northwest Forest and Range Experiment Station. His tasks at Wind River included remeasuring reforestation plots, establishing growth plots, and performing cooperative work on rodent control. At the Cascade-Siskiyou Research Center in Roseburg, Oregon, he conducted reforestation studies and led a seeding, planting, and nursery practices research unit for 13 years based in Portland and Corvallis. Large-scale field studies on reforestation alternatives started before retirement in 1990 continued to draw much of his time as an emeritus researcher. He had been a member of the Society of American Foresters since 1949.

John P. (“Jack”) Vimmerstedt ’58 MF ’65 DF (1931–2021) served in the Navy after he graduated from high school in Shreveport, Louisiana. He earned his BS in forestry from LSU and was hired by Union Bag Paper Co. in Savannah, Georgia. In 1954, Bob married Annie (“Billye”) Jenkins and had three children. His oldest daughter was born in Yale New Haven Hospital while Bob was a student at YSE after receiving a scholarship in 1956. He received his degree from Yale in 1957 and continued to work for YPC (later, Union–Camp Paper Co.) for a total of 41 years. After retirement, he and Billye moved to Lake Prince Woods, a retirement community in Suffolk, Virginia. Bob passed away on March 30, 2005, and was interred in Houston Veterans Cemetery in Suffolk, Virginia. “Bob was very proud of his time at Yale!” says Billye.

Robert A. Walton ’57 MF (1920–2010) served in the Navy after he graduated from high school in Stroversport, Louisiana. He earned his BS in forestry from LSU and was hired by Union Bag Paper Co. in Savannah, Georgia. In 1954, Bob married Annie (“Billye”) Jenkins and had three children. His oldest daughter was born in Yale New Haven Hospital while Bob was a student at YSE after receiving a scholarship in 1956. He received his degree from Yale in 1957 and continued to work for YPC (later, Union–Camp Paper Co.) for a total of 41 years. After retirement, he and Billye moved to Lake Prince Woods, a retirement community in Suffolk, Virginia. Bob passed away on March 30, 2005, and was interred in Houston Veterans Cemetery in Suffolk, Virginia. “Bob was very proud of his time at Yale!” says Billye.
Wan Ping Chua ‘21 MEM and Leah Wise ’22 DIV may have grown up halfway around the world from each other, but their respective skills and experience complemented each other perfectly when a shared commitment to sustainability brought them together to work on the Yale School of the Environment sustainable swag project.

For the project, Chua and Wise spent several months working under the direction of Sara Smiley Smith ’07 MESc, ’07 MPH, ’16 PhD, associate dean of academic affairs, research, and sustainability, researching the design and sourcing of new apparel items — the first new swag items produced since the name change to the Yale School of the Environment (from Yale School of Forestry & Environmental Studies) and the establishment of The Forest School — to ensure they met high standards of sustainability.

Growing up in Singapore, Chua developed an early interest in sustainability when she attended the country’s first liberal arts college of the Environment (from Yale School of Forestry & Environmental Studies) and the establishment of The Forest School — to ensure that every choice is a compromise, but that doesn’t mean it’s bad. “It wasn’t always clear whether a domestically produced non-organic T-shirt or a fair trade, organic T-shirt produced overseas was a better option. And then we needed to account for size inclusivity, price point, and consumer demand,” Wise says. “In working toward our sustainability goals, it became clear to me that every choice is a compromise, but that doesn’t mean it’s bad. We need dramatic change across the industry, and I hope that in sharing our process, we can show that the fashion industry already has the tools and resources to do better.”

As a life cycle associate at SCS Global Services, Chua is already putting what she learned into practice to help the company’s clients achieve their sustainability goals.

“Leah brought with her a lot of on-the-ground experience, which is not necessarily reflected in LCA databases,” she says. “In that sense, LCA was more of a guiding framework for us, and we were able to combine those real experiences to make the analysis richer. “LCA was more of a guiding framework for us, and we were able to combine those real experiences to make the analysis richer. “We help clients identify where the hot spots are along their product’s value chain and consequently direct them on order to reduce environmental impacts,” Chua says. “It is really interesting since the work spans sectors from fashion to tech to agriculture and even services-based industries.”

Wise’s “deep dive” also inspired her to start StyleWise, an ethical fashion blog in which she offers information and shopping guides to help readers find more sustainable alternatives to popular brands. Wise’s experience with the complexity of weighing ethical and sustainable choices proved extremely valuable when researching the options for YSE apparel, as things weren’t always cut and dried.

“Leah came with a wealth of experience with apparel and consumer choices in the ‘real world’ since she worked at a national retail chain more than a decade ago. ‘I noticed that some of the merchandise was listed as handmade by artisans, and I began to wonder what it meant for a $2 item to be handmade by someone on the other side of the world,’ says Wise. ‘It inspired me to do a deep dive into the ethics of manufacturing.’

Wise’s “deep dive” brought with her a lot of on-the-ground experience, which is not necessarily reflected in LCA databases, “In that sense, LCA was more of a guiding framework for us, and we were able to combine those real experiences to make the analysis richer. "Leah brought with her a lot of on-the-ground experience, which is not necessarily reflected in LCA databases," she says. "In that sense, LCA was more of a guiding framework for us, and we were able to combine those real experiences to make the analysis richer. "Wise says part of what made their research approach unique was Wise’s real-world experience with apparel and consumer choices.

Growing up in Singapore, Chua developed an early interest in sustainability when she attended the country’s first liberal arts college of the Environment (from Yale School of Forestry & Environmental Studies) and the establishment of The Forest School — to ensure that every choice is a compromise, but that doesn’t mean it’s bad. "It wasn’t always clear whether a domestically produced non-organic T-shirt or a fair trade, organic T-shirt produced overseas was a better option. And then we needed to account for size inclusivity, price point, and consumer demand," Wise says. "In working toward our sustainability goals, it became clear to me that every choice is a compromise, but that doesn’t mean it’s bad. We need dramatic change across the industry, and I hope that in sharing our process, we can show that the fashion industry already has the tools and resources to do better." As a life cycle associate at SCS Global Services, Chua is already putting what she learned into practice to help the company’s clients achieve their sustainability goals.

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