FORWARD FEST

RESOURCE GUIDE

April 2021

A YEAR OF FORWARD THINKING

A YEAR OF
FORWARD
THINKING

What Is A Year of Forward Thinking?

A Year of Forward Thinking spans the 2020–21 academic year and engages the entire Princeton University community — alumni, students, faculty, staff and friends — in a global conversation about pioneering solutions for today's challenges.

forwardthinking.princeton.edu

FORWARD FEST

What Is Forward Fest?

Forward Fest is a monthly online series of discussions with Princeton faculty, students, staff, alumni and other interested thinkers who will explore, engage and develop bold thinking for the future.

How to Use This Resource Guide

Binge as background reading to prepare for the Forward Fest discussions, follow along during the programming and use the information to fuel conversations with Princetonians and others about ideas that merit Thinking Forward together.

forwardthinking.princeton.edu/festival

FORWARD THINKERS

Jesse Jenkins

Assistant Professor of Mechanical and Aerospace Engineering and the Andlinger Center for Energy and the Environment

Forrest Meggers

Assistant Professor of Architecture and the Andlinger Center for Energy and the Environment; Co-Director, Program in Architecture and Engineering

Shana S. Weber

Director, Office of Sustainability; Lecturer in the High Meadows Environmental Institute

Claire E. White

Associate Professor of Civil and Environmental Engineering and the Andlinger Center for Energy and the Environment

Juliet Eilperin '92

Senior National Affairs Correspondent, The Washington Post; Author; Forward Fest moderator

Jenkins and White are also associated faculty at the High Meadows Environmental Institute.

THURSDAY, APRIL 15, 2021

4:00 PM – 5:15 PM EDT

Thinking Forward the Environment

forwardthinking.princeton.edu/forwardthinkers

THINKING FORWARD: THE ENVIRONMENT

OUR PLANET faces multiple environmental crises that threaten to do incalculable damage to human well-being and the natural world. Today's college students will be forced to deal with the effects of this global emergency — particularly climate change, the loss of biodiversity, and food and water shortages, calamities that are expected to peak around 2050. It is critical that we think forward actionable solutions for our own local areas and for the planet.

Princeton has deep roots in environmental research and discovery, and for more than half a century, its forward thinkers — from a variety of academic disciplines — have made pivotal contributions to solving some of humanity's toughest problems related to climate, food and water, biodiversity and energy. Academic centers of excellence such as the High Meadows Environmental Institute (HMEI) and the Andlinger Center for Energy and the Environment have contributed to the University's mission of promoting innovation and collaboration in environmental studies across disciplines. Nearly every department at the University — from the sciences to the humanities — is working to develop actionable solutions at every scale, including the Princeton campus, which itself serves as a lab. The University's Sustainability Action Plan in 2019 set bold targets to achieve net zero greenhouse gas emissions by 2046, which is the University's 300th anniversary, and outlined innovative strategies to engage all faculty, staff and students in creating a sustainable campus and future.

> "The last half century of research at Princeton on the environment can be thought of as one big gulp of excitement, leadership and innovation."
>
> — ROBERT H. SOCOLOW, professor emeritus, department of mechanical and aerospace engineering; father of Princeton's interdisciplinary environmental research

» To explore 50 years of Princeton environmental research, including faculty forward thinkers and research stories and videos, visit "A Half-Century at the Forefront"

FORWARD THINKER

Jesse Jenkins

Jesse Jenkins is a macro-scale energy systems engineer with a focus on the rapidly evolving electricity sector, including the transition to zero-carbon resources, the proliferation of distributed energy resources, and the role of electricity in economy-wide decarbonization. “I develop models that can help us explore how the transformation of the electricity sector might occur,” he said. “I also use the models to evaluate other challenges to energy system transitions (besides cost), such as land use, infrastructure build-out and other impacts.” An assistant professor with a joint appointment in the Department of Mechanical and Aerospace Engineering and the Andlinger Center, Jenkins also serves as one of the lead researchers of the Princeton Net-Zero America study, which outlines five distinct technological pathways for the United States to decarbonize its entire economy by 2050.

Photo: Princeton University, ACEE, Frank Wojciechowski

MORE FORWARD THINKERS OF NOTE

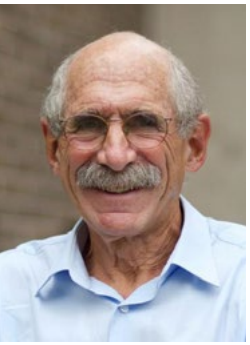


Photo: Egan Jimenez, Princeton School of Public and International Affairs

Michael Oppenheimer, the Albert G. Milbank Professor of Geosciences, International Affairs, and the High Meadows Environmental Institute and director of the Center for Policy Research on Energy and the Environment — a leading expert on climate change whose contributions to the Intergovernmental Panel on Climate Change helped it win the Nobel Peace Prize.

Allison Carruth, professor of American studies and the High Meadows Environmental Institute — an author and multimedia storyteller who cultivates narratives that illuminate pressing environmental problems, re-imagining the boundaries between the arts, humanities and sciences.

MEET MORE of Princeton’s environmental research leaders.

› It may seem like 2050 is a long way off. But if you think about the timelines for policies, business decisions and capital investments, it’s really more like the day after tomorrow. ›

FORWARD THINKER

Forrest Meggers

Forrest Meggers is an engineer and architect who studies building systems, radiant heating and cooling systems, geothermal and heat source/sink optimization, and ultra-efficient air conditioning. “Buildings are responsible for about half of all greenhouse gas emissions when the indirect impacts of energy supply, forestry, waste emissions and materials such as cement are included,” he said. “By thinking about how we design and use materials in our built environment more broadly, we can drastically reduce building CO_2 production.” To that end, Meggers founded and directs Princeton’s CHAOS (Cooling and Heating for Architecturally Optimized Systems) Lab, where he and his research team investigate thermal models to equip buildings for maximum performance. He has several patents and founded the spinoff Hearth Labs to measure the missing half of thermal comfort using a smart sensor technology to improve thermostats.

› Ultimately, we can maximize performance by changing the paradigm from making rooms comfortable to making people comfortable. ›

MORE FORWARD THINKERS OF NOTE

Photo: Denise Applewhite, Office of Communications

Rob Nixon, the Thomas A. and Currie C. Barron Family Professor in Humanities and the Environment and professor of English and the High Meadows Environmental Institute — a scholar and writer who studies environmental justice, climate change and how the arts can precipitate social transformation.

Stephen Pacala, the Frederick D. Petrie Professor in Ecology and Evolutionary Biology — a biologist who develops mathematical models that explain ecological structure and function, and directs the Carbon Mitigation Initiative, a major Princeton research center within the High Meadows Environmental Institute that he co-founded to address the carbon and climate problem.

MEET MORE of Princeton’s environmental research leaders.

FORWARD THINKER

Shana S. Weber

Shana S. Weber is an environmental scientist who advances strategic actions across campus toward realizing an ethos of sustainability in service to local and global communities. “Every global issue has a local manifestation — somewhere, everywhere,” Weber said. “What is our role, as a University, in taking advantage of this microcosm that we have here to tease out solutions to those global problems?” As the founding director of Princeton University’s Office of Sustainability, she has cultivated organizational change via repeatable and scalable sustainability initiatives since 2006. Through the High Meadows Environmental Institute, she’s brought her campus-as-lab approach to research and solutions into the classroom. Her office spearheaded Princeton’s 2019 Sustainability Action Plan, which strives to develop best practices and innovation in sustainability to accelerate action at all scales, from personal to global. “This plan is ambitious,” Weber said. “At the same time, the plan strives to be honest about clear progress as well as intractable challenges as we grapple and tinker with solutions.

Photo: Nick Donnoli, Office of Communications

› Our campus is a microcosm of the world. We can examine almost any dimension of a global sustainability challenge and see its reflection here at Princeton. ›

MORE FORWARD THINKERS OF NOTE

Photo: Denise Applewhite, Office of Communications

Lars Hedin, the George M. Moffett Professor of Biology and professor of ecology and evolutionary biology and the High Meadows Environmental Institute — a biologist who studies how biogeochemical cycles are changing globally in response to large-scale modern human activities, and how such changes influence evolutionary environments of plants and microbes.

Photo: David Kelly Crow

Ning Lin *10, an associate professor of civil and environmental engineering — an engineer who integrates science, engineering and policy to study hurricane-related weather extremes, how they change with a changing climate, and how their impact on society can be better mitigated.

MEET MORE of Princeton’s environmental research leaders.

FORWARD THINKER

Claire E. White

Claire E. White is an engineer whose research focuses on optimizing engineering and environmental materials, including sustainable cements and materials for carbon capture, utilization and storage. An associate professor in civil and environmental engineering and the Andlinger Center for Energy and the Environment and Andlinger's acting associate director for research, White also runs Princeton's Sustainable Cements Group, a multi-disciplinary research group addressing the sustainability challenge facing cementitious materials and related systems. "With production of concrete expected to double over the next 50 years, there is a great need for more sustainable alternatives," she said. "One viable alternative that has emerged is alkali-activated concrete [with] CO_2 emissions that are 80 to 90 percent lower than conventional concrete." White's research has advanced the understanding of the chemistries and properties of the alkali-activated materials, including their durability and resistance to carbonation.

Photo: David Kelly Crow

› Finding durable [construction] alternatives will be crucial in order to make a large dent in reducing the amount of greenhouse gases we are releasing into the atmosphere. ›

MORE FORWARD THINKERS OF NOTE

Photo: David Kelly Crow

Anu Ramaswami, the director of the Chadha Center for Global India, the Sanjay Swani '87 Professor of India Studies, and professor of civil and environmental engineering — an engineer recognized as a pioneer on the topic of sustainable urban infrastructure systems.

Elie Bou-Zeid, professor of civil and environmental engineering and director of the Program in Environmental Engineering and Water Resources — an engineer who chairs the Princeton Metropolis Project, which aims to guide technological innovations toward a pathway that improves urban living.

MEET MORE of Princeton's environmental research leaders.

FORWARD THINKING

CENTERS OF EXCELLENCE

The High Meadows Environmental Institute

Founded in 1994 as the Princeton Environmental Institute, the recently renamed High Meadows Environmental Institute (HMEI) — following a gift from Judy and Carl Ferenbach III '64 and the High Meadows Foundation — informs solutions to local and global challenges by conducting groundbreaking research across disciplines and by preparing future leaders in diverse fields for a world increasingly shaped by climate change. "All of our faculty have agreed that our informal motto that we use these days is, indeed, 'environmental engagement across disciplines,'" said Michael Celia *79 *83, HMEI's director and the Theodora Shelton Pitney Professor of Environmental Studies and professor of civil and environmental engineering. "Because we all believe there is not a single discipline by itself that can solve the major global problems that we face."

The Andlinger Center for Energy and the Environment

A multidisciplinary research and education center established in 2008, the Andlinger Center strives to develop technologies and solutions to secure our energy and environmental future. A chief goal is to translate fundamental knowledge into practical solutions that enable sustainable energy production and the protection of the environment and global climate from energy-related anthropogenic change. "Technology alone isn't going to cut it," said Yueh-Lin (Lynn) Loo *01, director of the center, the Theodora D. '78 and William H. Walton III '74 Professor in Engineering, and professor of chemical and biological engineering. "In addition to scientists and engineers, social science is an important component and policy is an important component."

The Center for Policy Research on Energy and the Environment

The Center for Policy Research on Energy and the Environment (C-PREE) is an interdisciplinary research center committed to training leaders in the field of environmental and energy policy. Born out of the long-standing Science, Technology and Environmental Policy program within the Princeton School of Public and International Affairs (SPIA), C-PREE's faculty consists of experts who are leading scholars and have served as practitioners in government agencies, NGOs and the private sector. C-PREE connects SPIA's expertise in policy and social science with the natural science and engineering research of HMEI, Andlinger and other departments across the University.

In the spotlight: three of Princeton's centers of excellence in environmental research and discovery that span the natural sciences and humanities; engineering, energy, and applied science; and public policy. For the ecosystem of departments and centers focused on the environment, see page 11.

FORWARD THINKING
ECOSYSTEM OF EXCELLENCE

Princeton's environmental research spans the entire University. Click on the photos below to explore the depth and breadth of research taking place across our campus and beyond.

Andlinger Center for Energy and the Environment (ACEE)

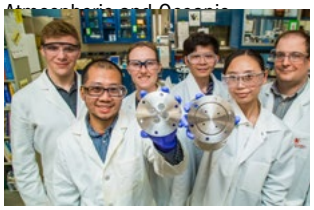
Sciences Program (AOS)

Carbon Mitigation Initiative (CMI)

Center for BioComplexity

C-PREE
Center for Policy Research on Energy and the Environment

Center for Policy Research on Energy and the Environment (C-PREE)



Chemical and Biological Engineering (CBE)

Civil and Environmental Engineering (CEE)

CIMES

Cooperative Institute for Modeling the Earth Systems (CIMES)

Ecology and Evolutionary Biology (EEB)

PRINCETON GEOSCIENCES

Geosciences

High Meadows Environmental Institute

High Meadows Environmental Institute (HMEI)

Integrated GroundWater Modeling Center (IGWMC)

Mechanical and Aerospace Engineering (MAE)

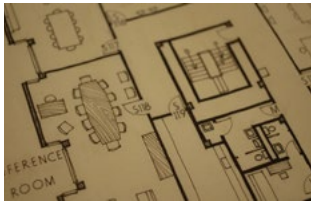
Mpala Research Centre

Office of Sustainability

UNITED STATES DEPARTMENT OF ENERGY
PPPL
PRINCETON PLASMA PHYSICS LABORATORY

Princeton Plasma Physics Laboratory (PPPL)

Princeton School of Public and International Affairs (SPIA)



School of Architecture

Southern Ocean Carbon and Climate Observations and Modeling (SOCCOM)

PRINCETON UNIVERSITY

FORWARD THINKING

UNIVERSITY INITIATIVES

Net-Zero America

In December 2020, 10 Princeton researchers and eight external collaborators published the Net-Zero America report, outlining five distinct technological pathways for the United States to decarbonize its entire economy in the next 30 years. The research is the first study to quantify and map with this degree of specificity the infrastructure that needs to be built and the investment required to run the country without emitting more greenhouse gases into the atmosphere than are removed from it each year. The work aims to inform and ground political, business, and societal conversations regarding what it would take for the U.S. to achieve an economy-wide target of net-zero emissions by 2050.

CAMPUS AS LAB

Campus as Lab

The Campus as Lab (CAL) program supports the University's Sustainability Action Plan by facilitating the use of campus for sustainability research and experiential learning. Explorations into the social, physical, and operational dimensions of Princeton can generate new knowledge to help to advance sustainability on campus, in our broader community, and around the world. Students, faculty and staff have participated in dozens of research projects using Princeton's campus as a living laboratory to help solve global sustainability challenges, from restoration of the Washington Road stream to a vertical farming project to the S.C.R.A.P. Lab composting project.

FORWARD THINKING
ENVIRONMENTAL JUSTICE

David Bradford Energy and Environmental Policy Seminar Series

The Bradford Seminars, named for the late economics and public affairs professor and organized by the Center for Policy Research on Energy and the Environment (C-PREE) with HMEI co-sponsorship, has hosted hundreds of scholars and practitioners from various fields related to environmental and energy policy since 1999. Environmental justice is a particular focus this year, and the 2020-21 schedule of sessions includes experts who have addressed the issues of land-use and zoning tools for environmental justice, the impact of climate change on Indigenous communities, and policy approaches to reduce air pollution from power plants that disproportionately impact low-income areas. Videos of past lectures are available on YouTube.

Environmental Justice: What Can I Do?

During Wintersession, about 30 Princeton students participated in a five-day workshop to learn the "tools and resources necessary to engage in meaningful environmental justice advocacy." Two students, Mayu Takeuchi '23 and Kim Tran '24, co-facilitated the workshop with Priscilla Hayes '75, an environmental lawyer and activist. Guest speakers included community organizers and environmental activists who have worked for clean air and water in cities such as Newark and Camden, and Takeuchi and Tran assembled a syllabus of educational resources so that participants can continue learning about environmental justice and how to get involved.

FORWARD THINKING STUDENTS

Kiley Coates ’20

As a geosciences student, Kiley Coates ’20 wanted to help solve environmental issues and create a more sustainable campus. She volunteered at the S.C.R.A.P. Lab, and ended up writing an analysis of the composting process for her senior thesis. “The S.C.R.A.P. Lab is a great step to not only reduce food waste on campus, but model how this could be applied in other settings,” she said. “On a smaller scale, I also learned a lot about various projects on Princeton’s campus and how to apply them even when I left Princeton — having my own compost pile, using reusable silverware even outside the home, etcetera.”

Grace Liu ’23

A computer science student, Grace Liu ’23 is working with her faculty advisers to determine if Lake Carnegie not being suitable for ice skating since the winter of 2014-2015 is part of a larger trend linked to climate change. Tracking the lake’s winter history through interviews and media accounts, Liu found that the chances of ice on Lake Carnegie being thick enough to skate on has plummeted since 1950 and by more than half since 2000. “The freeze proportion has decreased pretty alarmingly in the past several years,” Liu said. “Within a matter of decades, the probability of safe ice skating on Lake Carnegie has dropped from 1 to 0.2.”

FORWARD THINKING STUDENTS

Photo: Mary Caswell Stoddard, Department of Ecology and Evolutionary Biology

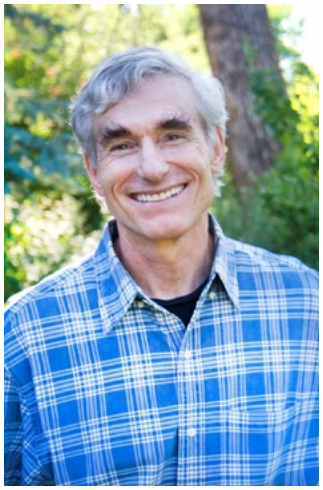
Cole Morokhovich ’20

After the course “Life on Earth: Chaos and Clockwork in Nature” piqued his interest, Cole Morokhovich ’20 interned at the Rocky Mountain Biological Laboratory in Colorado, studying the effects of climate change on the behavior of broad-tailed hummingbirds. The experience grew into his senior thesis, which focused on how climate change may be affecting the bloom cycle of flowers that the hummingbirds rely on for food. “It’s interesting to me that these fascinating little birds are allowing me to talk to people about climate change,” Morokhovich said. “And maybe that makes those people a little more aware.”

Hannah Reynolds ’22

As a High Meadows Environmental Institute Smith-Newton Environmental Scholar, Hannah Reynolds ’22 visited the homeland of the Tlingit, Haida and Tsimshian peoples in southeast Alaska to study the connections between Indigenous language, culture and land use. Conducting surveys and interviews in the region, Reynolds set out to rethink how environmental justice efforts can be tailored to fit the specific needs of Alaska Native communities that have lived and depended on the land for as long as 10,000 years, rather than simply focusing on conservation.

FORWARD THINKING ALUMNI



Tom Barron ’74

Author

Barron is a bestselling author whose books celebrate the inspiration of nature and the ability of every person to make a difference. At Princeton, Barron has played a critical role in supporting HMEI, including naming full and visiting professorships in the environmental humanities, creating a freshman seminar in environmental writing, and establishing an endowed fund for biodiversity research.

Mitchell Bernard ’73

President and chief counsel, Natural Resources Defense Council

Bernard has worked at the Natural Resources Defense Council for more than 25 years, focusing legal attention on the most pressing environmental challenges, including climate change, clean energy, water, air, toxics and environmental justice. As chief counsel, Bernard has litigated cases against Texaco, Mallinckrodt Pharmaceuticals, Duke Energy and a variety of government agencies.

Angelo Campus ’16

CEO and co-founder, BoxPower

Campus co-founded BoxPower as a Keller Center eLab startup that builds and distributes specialized shipping containers equipped with solar panels, a battery for energy storage and a backup generator. The units are essentially containerized microgrids that provide quick and dependable access to a power source for people far removed from electrical power sources or communities recovering from natural disasters.

Katie Carpenter ’79

Documentary filmmaker

Carpenter is an award-winning documentary filmmaker specializing in environmental subjects for public and cable television. Her films have aired on Discovery Channel, MSNBC, Fox, ABC and PBS, and she taught documentary filmmaking at Princeton, including a one-semester global seminar on wildlife filmmaking at Princeton’s campus in Mpala, Kenya.

FORWARD THINKING ALUMNI

Photo: Amy Osborne

Ramón Cruz *02

President, Sierra Club

Last May, Cruz was elected president of the Sierra Club's Board of Directors, becoming the first Latino president in the organization's 128-year history. Previously, he worked as the deputy director of the environmental regulatory agency in Puerto Rico and held senior positions at the Environmental Defense Fund, the Partnership for New York City and the Institute for Transportation and Development Policy.

Photo: Bill O'Leary, Washington Post

Juliet Eilperin '92

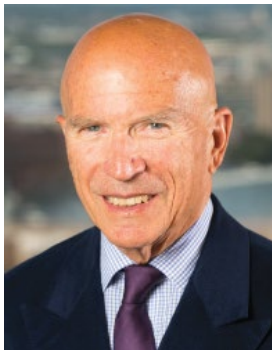
Senior National Affairs Correspondent, The Washington Post

Eilperin has worked for the Washington Post since 1998, most recently covering how the Trump administration transformed federal environmental policy and the agencies that oversee it. Last year, she was part of the team of journalists that won the Pulitzer Prize for explanatory journalism for the environmental project, "2°C: Beyond the Limit."

Carl Ferenbach III '64

Chairman, High Meadows Foundation

Ferenbach is the chairman and co-founder of the High Meadows Foundation and the High Meadows Fund, nonprofits that have made significant contributions to Princeton's environmental mission. He also is a director of Climate Central and a former chairman of the board of the Environmental Defense Fund.



Andrew Hsieh *14

CEO, Feasible

Hsieh and two of his Princeton colleagues, Barry Van Tassell *15 and Shaurjo Biswas, co-founded Feasible based on their research at Princeton developing technology that uses sound waves to determine the health and charge level of batteries — a promising breakthrough for electronic vehicles.

FORWARD THINKING ALUMNI

Photo courtesy of Apple Inc.

Lisa P. Jackson *86

Vice president of Environment, Policy and Social Initiatives, Apple Inc.

A former administrator of the U.S. Environmental Protection Agency, Jackson oversees Apple's efforts to minimize its impact on the environment by addressing climate change through renewable energy and energy efficiency, using greener materials, and inventing new ways to conserve precious resources.

Paula Kahumbu *02

CEO of WildlifeDirect

Kahumbu is one of Africa's best known wildlife conservationists and the founder of the Hands Off Our Elephants campaign, a widely successful effort to engage the people of Kenya and rally support for the protection of elephants against poachers. She also produces and hosts the TV show, "Wildlife Warriors," which champions Kenyan conservationists working on a range of environmental issues.

Annamie Paul *01

Leader of the Green Party of Canada

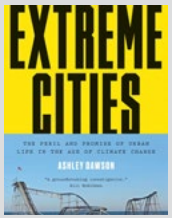
Paul had worked as a diplomat and lawyer across three continents before she was elected the leader of Canada's Green Party in 2020. She advocates for the goal of a carbon-neutral economy to improve human lives: "Our concern for the climate flows out of our concern about other things. If you're concerned about climate, you have to be concerned about social justice, about our social safety net. These things are all interconnected."

Carter Roberts '82

CEO and president, World Wildlife Fund

Roberts has been CEO and president of the World Wildlife Fund since 2004, leading an organization with five million members that works to preserve the Earth's wildest places through collaboration, community empowerment and government engagement at all levels. "We often talk about the importance of putting the 'movement' back in the environmental movement."

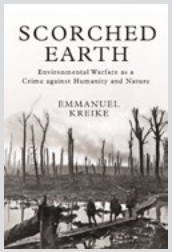
RECOMMENDED READING



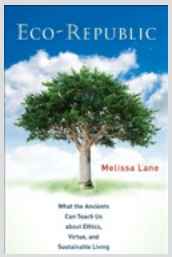
EXTREME CITIES: THE PERIL AND PROMISE OF URBAN LIFE IN THE AGE OF CLIMATE CHANGE, by **Ashley Dawson** (2017): A former Barron Visiting Professor, Dawson explains the hazy future for major metropolises, which produce enormous amounts of carbon pollution and are often vulnerable to rising seas.

Photo: DenisBalibouse/Reuters

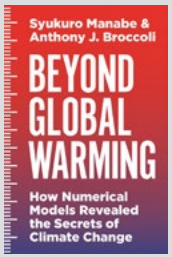
THE PATHS TO ZERO, by **Jesse Jenkins**, et al. (2020): The Princeton professor lays out how far we've come and the challenges that remain on the path to decarbonize global energy systems in this article from Foreign Affairs.



SCORCHED EARTH: ENVIRONMENTAL WARFARE AS A CRIME AGAINST HUMANITY AND NATURE, by **Emmanuel Kreike** (2021): Princeton history professor Kreike examines the costs of centuries of warfare on environmental infrastructure, resulting in famine, disease and displaced populations.



ECO-REPUBLIC: WHAT THE ANCIENTS CAN TEACH US ABOUT ETHICS, VIRTUE AND SUSTAINABLE LIVING, by **Melissa Lane** (2011): Director of Princeton's University Center for Human Values, Lane draws on ancient Greek thought to put forward a new vision of society where health and sustainability depend on all its citizens recognizing a shared standard of value.



BEYOND GLOBAL WARMING: HOW NUMERICAL MODELS REVEALED THE SECRETS OF CLIMATE CHANGE, by **Syukuro Manabe** and **Anthony J. Broccoli** (2020): A pioneer of modern climate modeling and a senior meteorologist at Princeton's Program in Atmospheric & Oceanic Science, Manabe tells his compelling firsthand account of how the scientific community came to understand the human causes of climate change.

SLOW VIOLENCE AND THE ENVIRONMENTALISM OF THE POOR, by **Rob Nixon** (2013): Nixon examines the overlooked forms of violence that are inflicted upon the world's most vulnerable populations by climate change, toxic drift, deforestation, oil spills and other environmental trends that are often exacerbated by economic forces.

PRINCETON UNIVERSITY'S SUSTAINABILITY ACTION PLAN (2019): Released on Earth Day 2019, the University's Sustainability Action Plan sets ambitious goals and shares the strategies to reach them, placing a premium on accountability and collaboration across departments.

GETTING TO GREEN, SAVING NATURE: A BIPARTISAN SOLUTION, by **Frederic C. Rich '77** (2016): Rich dives into environmental politics, calling for conservatives to reconnect with their conservationist traditions and for the Green movement to adopt the reforms necessary to restore bipartisan support for the environmental agenda.

THE RIGHT TO WATER: POLITICS, GOVERNANCE AND SOCIAL STRUGGLES, edited by **Farhana Sultana '96** and **Alex Loftus** (2012): With contributions from academics, policy-makers and activists, the book analyzes how struggles for the right to clean water have attempted to translate moral arguments over access to safe water into workable claims.

DISCERNING EXPERTS: THE PRACTICES OF SCIENTIFIC ASSESSMENT FOR ENVIRONMENTAL POLICY, by **Michael Oppenheimer**, et al. (2019): The authors explore how environmental experts deliberate and decide on the scientific facts about problems like acid rain, ozone depletion and sea level rise.

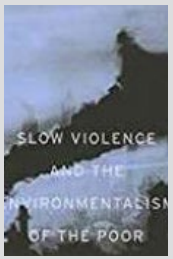
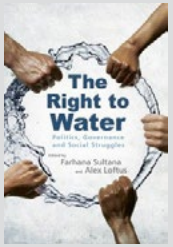
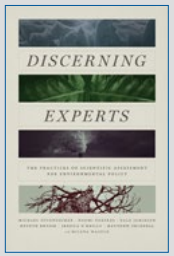


Photo: Christopher Lillia





WATCH AND LISTEN

PRINCETON: A HALF-CENTURY AT THE ENVIRONMENTAL FOREFRONT: Princeton University's environmental research has made pivotal contributions to solving some of humanity's toughest problems. How did the work begin? And where is it going next?

PRINCETON ENVIRONMENTAL FORUM: In October 2019, Princeton faculty and alumni environmental leaders gathered on campus for a series of discussions addressing urgent environmental issues for the 21st century.

NATURE'S NATION: AMERICAN ART AND ENVIRONMENT: The art exhibition, hosted by the Princeton University Art Museum, considered how American artists have reflected and influenced environmental understanding. View the exhibit catalog here.

AN INVITATION TO SUSTAINABILITY: The University's Office of Sustainability introduces new students to the concept of sustainability while providing palpable examples, such as political engagement, research, and water- and energy-saving practices.

STORM SURGE: FUTURE HAZARD AND DEFENSE: Princeton professors Gabriel Vecchi and Sigrid Adriaenssens describe new storm surge barrier designs that would protect people, businesses and infrastructure from destructive winds and water.

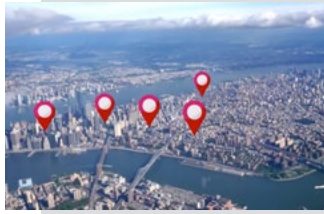
COASTAL RISK SCREENING TOOL: The Climate Central website invites you to explore sea level rise and coastal flood threats by entering locations on a map. Users can view how geography is expected to change based on the projected annual flood level in 2050.

THE OCEAN AS A BUFFER TO CLIMATE CHANGE: Professors Laure Resplandy and Daniel Sigman explain how the ocean absorbs heat and carbon dioxide, providing a buffer against climate change.

THE IMPORTANCE OF BIODIVERSITY: Professors Mary Casswell Stoddard and David Wilcove *85 discuss how healthy ecosystems are essential to the future of food, medicine and climate — and humans' impact on the loss of species.

ECOSYSTEMS AND DROUGHT: Professors Robert Pringle and Corina Tarnita discuss the elements of a healthy ecosystem, how drought affects vegetation patterns, and how they've found buffers against drought in unexpected places.

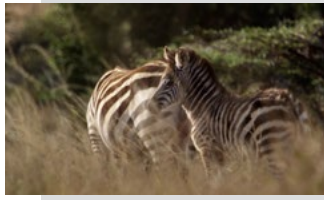
SUSTAINABLE URBAN SYSTEMS: Professor Anu Ramaswami describes how her research group works closely with city planners and policymakers worldwide to optimize the sustainability of urban infrastructure, including food, water, energy, shelter, mobility, waste management and open spaces.



ALL FOR EARTH PODCAST: Princeton's environmental leaders and distinguished guests delve into the urgency of today's environmental crises through in-depth interviews, describing the race to prevent the implosion of the critical and interconnected systems that support life on Earth.

All *for* Earth

MPALA, A LIVING LANDSCAPE: The Mpala Research Centre in central Kenya's Laikipia County combines a natural habitat teeming with wildlife, livestock operations and cutting-edge scientific research facilities.



DISCUSSION

As you continue to think forward about the environment, brainstorm these questions in order to extend and deepen the conversation.

1. What are some of the things your community is currently doing to slow climate change or mitigate its impacts? What else do you think could be done where you live?

2. Besides rising temperatures, what other environmental indicators have you noticed in your hometown that seem to signal a significant change in the climate?

3. How can the principles of storytelling help scientists and policymakers explain climate change in a way that will change behavior?

4. The facts of climate change can seem overwhelming and inevitable. What role does research on environmental science, policy and humanities play in providing reasons for optimism?

5. When you think about climate change, where and how do you think the grandchildren of our youngest generation will live as adults, and how might their lives be different than yours?

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