



Duke University Nicholas Institute for Environmental Policy Solutions Annual Report 2020

Meeting the Moment

COVID-19 Response

Oceanic Plastic Pollution

U.S. Army Corps of Engineers Reservoirs

North Carolina Climate and Energy Policy

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Established at Duke University in 2005, the Nicholas Institute for Environmental Policy Solutions helps decision makers create timely, effective, and economically practical solutions to the world's critical environmental challenges. Through its five programs, the Nicholas Institute mobilizes objective, rigorous research to confront the climate crisis, clarify the economics of limiting carbon pollution, harness emerging environmental markets, put the value of nature's benefits on the balance sheet, develop adaptive water management approaches, and identify other strategies to attain community resilience.

A Message from the Director: Responding to COVID-19 and the Fight for Racial Equality

As 2020 began, our 15th year at Duke University's Nicholas Institute for Environmental Policy Solutions promised to be one of our most significant.

The upcoming U.S. presidential election will set the course for how the country—and the world—would respond to the climate crisis and other major environmental issues in the coming years. The Nicholas Institute stood ready to contribute to these conversations.

Meanwhile, our professionals were lending their expertise to help policy makers at all levels address a variety of challenges—from meeting North Carolina's ambitious climate goals to adapting management of U.S. reservoirs in a changing world to stemming the flow of plastics into our oceans. New initiatives emerged, such as building the foundation for a potential federal-state partnership on climate change, examining rural Americans' attitudes toward environmental policy, and exploring ways to enhance power sector competition in the Southeast. Through it all, we sought to deepen our partnerships with Duke's world-class scholars and to find creative ways to prepare the next generation of leaders.

Then came COVID-19.

The global pandemic has affected nearly every aspect of human life; our work in the environmental and energy policy space is no exception. Most obviously, the need for social distancing has changed how we interact with policy makers and stakeholders. Video conferences and webinars have replaced face-to-face meetings and workshops, and Zoom has quickly gone from a novelty to an indispensable tool.

COVID-19, however, is not just altering *how* we work, but *what* we work on. Our professionals are re-examining long-studied topics through the lens of the novel coronavirus, while new topics have surfaced as a direct result of the twin public health and economic crises that we face. The main feature in this annual report describes some of these efforts.

In the midst of the pandemic, the United States is also facing a national reckoning on racial inequality. The country has mourned the killings of George Floyd, Breonna Taylor, Ahmaud Arbery, and Tony McDade, among the latest victims in our long history of systemic racism and police brutality.

The Nicholas Institute pledges more than outrage. We are making a sustained commitment to do better, both as individuals and as an organization, to contribute to addressing these injustices. That process starts with:

- Ensuring that racial equity frameworks and analyses inform more of our environmental policy work,
- Setting aside regular times to better educate ourselves, and
- Interrogating uncomfortable truths about our own structures.

We hope this is only the beginning of true change. I look forward to reporting back on our progress next year as we listen and learn how to help make it so.

This is an extraordinary moment in history. Now more than ever, the type of objective, timely analysis that the Nicholas Institute provides is critical to help policy makers navigate these times.

We cannot do this alone. As always, we invite you to contact us to discuss potential partnerships on research, engagement, and educational endeavors.

– Tim Profeta

Director, Nicholas Institute for Environmental Policy Solutions



FEATURES

Nicholas Institute Policy Analysis Meets the COVID-19 Moment

By Jeremy Ashton, Jason Gray, & Anna Nordseth

In March, governments around the world instituted a wave of lockdowns in an attempt to contain the growing COVID-19 pandemic. As people traveled less, [daily global greenhouse gas emissions notably declined](#), and cities long blanketed by air pollution suddenly offered their residents clear views—if only temporarily in both cases.

The likely emergence of the novel coronavirus from bats sparked discussions in the scientific community about ways to prevent future pandemics. [One analysis](#) by an international team of scientists and economists, led by researchers from Princeton and Duke universities, estimated that as little as \$22 billion a year invested in programs to curb wildlife trafficking and reduce deforestation could significantly reduce the risk of other viruses crossing over from the natural world to humans.

Even before COVID-19, the world was not on track to achieve the United Nations' [2030 Agenda for Sustainable Development](#). In a [progress report](#), U.N. Secretary-General António Guterres wrote that the pandemic has made achieving the 17 Sustainable Development Goals “even more challenging.”

While the human toll of the pandemic has rightly captured the bulk of the

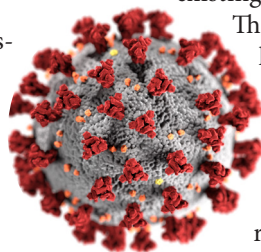
public's attention, these examples illustrate how profoundly the environment, energy consumption, and the policies around both have been affected in 2020.

Duke University's Nicholas Institute for Environmental Policy Solutions is applying the expertise of its professionals to rapidly evolving environmental and energy issues related to the pandemic. The Nicholas Institute has adapted existing research to these issues, while new areas of study have emerged.

Through the [“Policy in the Pandemic” email series](#), they have also analyzed short- and long-term trends in the environmental and energy policy space during the pandemic.

What follows are four stories about how Nicholas Institute projects are meeting the moment. How resources to develop sustainable infrastructure can be applied to help make the global economic recovery greener. How environmental health data is being analyzed to determine whether housing security policies to ease the economic burden on Americans are also reducing infection rates. How stay-at-home orders and more people working remotely in U.S. cities are affecting water use. And how access to parks in the Southeast is critical to people's physical and mental health during a time of social distancing.

Continue the story online at <http://bit.ly/NIAR20-COVID>



North Carolina's Path to Climate Resilience and a Clean Energy Economy

By Joanna Parkman



In October 2018, North Carolina Governor Roy Cooper issued Executive Order 80, a commitment to tackle climate change and build a clean energy economy. Most notably, the directive included an economy-wide target of reducing greenhouse gas emissions by 40 percent below 2005 levels by 2025. Since then, the state has made steady progress in evaluating climate mitigation and adaptation practices,

engaging diverse stakeholders, and developing an effective policy framework for reducing greenhouse gas emissions and enhancing resilience.

In late 2019, the North Carolina Department of Environmental Quality (DEQ) published the Clean Energy Plan to facilitate the use of clean energy resources and the development of a resilient electric grid across the state. The plan establishes an overall goal of reducing power sector greenhouse gas emissions by 70 percent below 2005 levels by 2030 and achieving carbon neutrality by 2050. Following this set of recommendations, DEQ released the North Carolina Climate Risk Assessment and Resilience Plan, the state's first climate adaptation plan, on June 17 of this year.

Continue the story online at <http://bit.ly/NIAR20-NCClimate>

Analysis Takes Stock of Policies to Address Oceanic Plastic Pollution

By Jeremy Ashton

Each year, millions of tons of plastic are estimated to flow out to sea from points around the world, endangering marine life, threatening food chains, and polluting shorelines. While that scale of the problem is certainly sobering, public opinion has recently been galvanized in many countries by images and videos of animals that have been tangled up in or eaten plastic.

Awareness has grown that everyone has a role in addressing the problem—from companies that make plastic products to the consumers who buy them. In particular, it is difficult to envisage solutions without action from governments, by virtue of their regulatory powers.

For this reason, researchers from Duke University's Nicholas Institute for Environmental Policy Solutions and the Nicholas School of the Environment set out to determine how governments around the world are responding to the

problem. Their search led them to [compile and analyze](#) an inventory of nearly 300 policies instituted between 2000 and mid-2019 to address plastic pollution.

“At the international and national level, we think this is probably the most detailed attempt to date to measure what governments are doing in response to plastic pollution, though admittedly incomplete,” said co-lead investigator John Virdin, director of the Ocean and Coastal Policy Program at the Nicholas Institute for Environmental Policy Solutions. “The next step would be to try to work with modelers and others to estimate how much of an effect these observed government responses will have on the problem.”

Continue the story online at <http://bit.ly/NIAR20-Plastics>

U.S. Army Corps of Engineers Reservoir Operations Adapt to a Changing World

By Anna Nordseth

The United States Army Corps of Engineers (USACE) owns and operates more than 500 reservoirs across the continental U.S. These reservoirs provide a means of harnessing rivers for navigation, flood control, water supply, hydro-power, and recreation. Today, many of the Corps' reservoirs are decades old and subject to ever-changing environmental and social pressures that threaten their ability to function as intended.

To better understand the state of the Corps' reservoirs, Martin Doyle and Lauren Patterson—director and senior policy associate, respectively, for the Water Policy Program at Duke University's Nicholas Institute for Environmental Policy Solutions—collaborated with the USACE to conduct a large-scale analysis of Corps-owned and -operated reservoirs.

“Most major reservoirs in the U.S. were designed and built 50 to 100 years ago to meet their needs then as well as the anticipated needs of the future,” said Patterson. “Today's reality includes a warming climate, shifting populations, technological advancements in water efficiency and energy sources, and new

policies and regulations, such as the Endangered Species Act. All of these influence the amount and timing of water in a reservoir.”

Doyle and Patterson's investigations focused on three central questions:

- How much have conditions changed from when reservoirs were designed?
- Are reservoirs meeting their designated management goals?
- What options are available when conditions are changing and reservoirs are no longer able to meet their management targets?

The results of this five-year project include [four interactive tools](#) that visualize data central to exploring these key questions and five publications that provide insight into the opportunities and challenges of improving the Corps' reservoir management for continued sustainability.

Continue the story online at <http://bit.ly/NIAR20-Reservoirs>

EDUCATION

PhD Students Explore Values and Make Lasting Connections through EIF Program

By Anna Nordseth

The complexity of today's environmental problems requires training that goes beyond a typical graduate education. Confronting environmental issues often requires interdisciplinary teams to work synergistically to approach issues from various points of view.

To foster this blending of perspectives, the year-long [Duke Environmental Impacts Fellow \(EIF\) Program](#) brings together PhD students from the Nicholas School of the Environment, the Pratt School of Engineering, and the Sanford School of Public Policy for five weekends of discussion, reflection, and workshops. The result is connections across disciplines that inspire and transform.

"I didn't expect to form such amazing connections with the other EIF fellows," said Kat Horvath, a third-year environmental engineering PhD candidate. "I truly believe that the relationships we are forming through this program will last our careers and that we will be permanently bonded."

This pilot program aims to fill a gap in traditional PhD training. Lydia Olander, the Ecosystem Services Program director at the Nicholas Institute and EIF program coordinator, describes it as "an opportunity for students to step away from the day to day, think about what they would like to achieve with their research and careers, and acquire skills and networks to help them achieve their goals and have impact." The program allows students to explore a variety of potential career paths they might follow, including non-academic or nontraditional academic positions.

The concept for the EIF program came from Emily Bernhardt, professor in the Department of Biology, and Martin Doyle, director of the Water Policy Program at the Nicholas Institute for Environmental Policy Solutions and professor at the Nicholas School. Inspired by the [Leopold Leadership training](#) they received as early career faculty, Bernhardt and Doyle sought to create a similar opportunity for Duke PhD students that could help shape their professional trajectories while still in graduate school and give them a head start on meaningful careers.

For Bernhardt, EIF is about "learning how to keep all of yourself as an academic or professional" to buffer against graduating with little sense of

purpose at the end of five or more years. EIF advocates setting aside time for self-reflection and creating space for conversations that span disciplines.

The EIF program is structured around four pillars of professional training: (1) self-awareness, (2) strategic career planning, (3) communication, and (4) engagement. For each module, fellows and external trainers spend one or two weekends honing in on how they relate to each pillar and developing these strengths to benefit their careers.

"For me, the most useful component of the program so far has been reflecting on my strengths and weaknesses in working effectively under different group and individual contexts," said Alice Carter, a third-year PhD student studying urban stream ecology notes.

Through self-reflection on personal values and practicing effective cross-disciplinary connections, EIF participants develop a clearer view of how their PhDs can be put to work after Duke.

"The EIF program has helped me gain a better understanding of the opportunities outside of academia that are equally as compelling and interesting," said Erika Smull, a first-year PhD student studying water supply finance and management. "I think sometimes academia teaches us to believe that anything outside of academia is boring, easy, or unimportant, and that is just not true."

The EIF program is funded by the Office of the Provost, Nicholas School of the Environment, Sanford School of Public Policy, Pratt School of Engineering, Trinity College of Arts & Science, Divinity School, and the Nicholas Institute for Environmental Policy Solutions.



Students Go to Boot Camp to Get Environmental Policy Knowledge in Shape

By Jeremy Ashton

On a Friday afternoon in October, more than 40 Duke University students put off the start of their weekends to cram into the fifth-floor boardroom of Grainger Hall.

Boxes of pizza waited for them on the tables, but the prospect of a midday snack/early dinner wasn't the reason they had gathered after a long week of classes. They came to get their questions answered about how Congress makes environmental policy.

The ensuing two-hour discussion was the first of nine [Policy Boot Camps](#) hosted by the Nicholas Institute for Environmental Policy Solutions over the 2019–2020 academic year. The sessions were designed to give Duke students an opportunity to learn about environmental policy-making institutions—what they are, how they work, and how to engage them—through informal conversations with Nicholas Institute professionals.

“The time with the students was a blast,” said Tim Profeta, the Nicholas Institute’s director, who led the first boot camp. “The free-flowing conversation made it so much easier to share insights, and to ensure I was responding to the questions that were really on their mind. I hope they got as much out of it as I did.”

For that discussion, Profeta pulled from two decades of working with Congress—first as a staffer to former Connecticut Sen. Joseph Lieberman and now as a bridge to Duke’s world-class research to help inform policy making.

In the boot camps that followed, other Nicholas Institute professionals drew on their own experiences to delve into topics ranging from federal departments and agencies to green banks. Jackson Ewing, a Nicholas Institute senior

fellow, talked about working with environmental ministries in China and Southeast Asian countries as part of a January session that he co-led with Energy Access Project Director Jonathan Phillips.

“Learning goes both ways in the Policy Boot Camps,” Ewing said. “The students are curious about the issues we’re working on, career trends in those spaces, and the routes we took to our current roles. As a presenter, it was illuminating to see what things the students grabbed onto the most, and hearing about their plans and ambitions gave me new ideas about where my field might be heading.”

The relaxed atmosphere kept the conversations flowing between the seasoned professionals and students. Conor Mulderrig, a master of environmental management (MEM) student in the Nicholas School of the Environment, said that helped put everyone in the room on an equal footing.

“The boot camps really gave me a chance to appreciate the level of discourse that my peers bring at the Nicholas School,” said Mulderrig, who is studying climate change policy. “It was fantastic to hear from respected experts, but the time devoted to follow-ups was often when I gained new perspectives on an issue.”

For both Mulderrig and fellow MEM student Gray Li, the boot camps presented a networking opportunity that led to assistantships with the Nicholas Institute.

In her studies, Li is focused on the economics of carbon pricing and how it could be used to address climate change. She described the boot camps as a great venue for hearing about specific topics that would not necessarily be covered in her classes.

“Going into those boot camp sessions as a first-year graduate student was very eye opening,” Li said. “It was a good opportunity for me to gain first-hand information on what it is like to be working in related fields, climate and carbon pricing for me in particular.”

After campus events were canceled in March because of COVID-19, the final scheduled session and a social hour for career advice were moved to Zoom video conferencing software. The pizza boxes in Grainger Hall may have been replaced by video and chat boxes on a computer screen, but the discussions still helped students get their environmental policy knowledge in shape.



NEW INITIATIVES

Spearheading a Federal-State Partnership to Combat Climate Change

By Anna Nordseth

The United States emits nearly one-sixth of the world's greenhouse gasses each year and ranks first among all countries in historic emissions. This gives the U.S. a proportionately high responsibility to curb greenhouse gas emissions. Yet, partisan political gridlock has left it in a state of paralysis, unable to take action in the face of the climate crisis.

“We need to act on climate urgently,” said Tim Profeta, director of the Nicholas Institute for Environmental Policy Solutions. “There have been a number of proposals that have been through Congress, but they’ve all been unsuccessful because of political differences.”

Profeta has proposed a new strategy for cutting U.S. climate emissions by playing to the strengths of the government's federalist structure through a

partnership between state and federal governments.

The federal and state governments have worked together throughout the nation's history to mandate and carry out environmental regulations. For instance, states have been responsible for meeting federal pollution targets surrounding air quality for decades.

Similarly, a federal-state partnership on climate change would allow states to meet federal emissions targets with whatever approach or combination of approaches that best fits that state's needs and socioeconomic context.

Continue the story online at <http://bit.ly/NIAR20-FedState>

Bridging the Gap between Rural and Urban Voters on Environmental Policy

By Jason Gray

Working to solve the climate crisis and other environmental issues in the United States will require the participation of rural Americans. Rural America has an outsized impact on the management of farms, ranches, and forests and also punches above its weight in the halls of Congress. So rural attitudes toward these issues and potential policy solutions matter a great deal. But rural voters and their representatives often voice less support for environmental regulations than their urban and suburban counterparts. A group of researchers wanted to find out why and whether different policies or other means of engagement might appeal to rural voters on environmental policy.

The research team was comprised of: Robert Bonnie, executive in residence at Duke University's Nicholas Institute for Environmental Policy Solutions; Emily Pechar Diamond assistant professor of communications studies at the University of Rhode Island; Drew Bennett, professor of practice of private lands stewardship at the University of Wyoming; and Elizabeth Rowe, a master's student in environmental management at Duke's Nicholas School of the Environment. Jay Campbell of Hart Research Associates and Lori Weigel of



House Energy & Commerce Committee

New Bridge Strategy conducted polling and focus groups for the team.

The study began with four in-person focus groups in North Carolina, which were conducted as part of a class offered through the Sanford School of Public Policy that allowed students to help design and observe focus groups. The study eventually expanded to a national survey of more than 2,000 registered voters, focus groups with more than 125 rural voters, and in-depth interviews with rural leaders in agriculture, forestry, and government, as well as tribal leaders. Two additional studies would eventually spin off from the research focusing on rural attitudes specifically toward climate change and attitudes of rural Westerners.

Although the researchers found a divide between urban and rural voters, it was not defined by who cares more about the environment. Each group valued the environment about the same but differed on what specific issues were most important. Clean water was highly valued by both groups, but rural voters prioritized conservation of farmland over climate change, for instance. Rural stakeholders also broadly believe that environmental protection and economic prosperity, in fact, go hand in hand.

Continue the story online at <http://bit.ly/NIAR20-RuralAttitudes>



Nicholas Institute Informs Discussions to Enhance Power Sector Competition

By Joanna Parkman

Most residents of the Southeast get their energy from a single, vertically integrated utility that controls the production, sale, and distribution of power. But across the country, many electric utilities have turned to Regional Transmission Organizations (RTOs) and other wholesale markets with enhanced competition.

Conversations are underway among policy makers and stakeholders in the Southeast to explore whether more competition in the power sector could encourage clean energy investment, spur innovation, and lower costs for consumers. The Climate and Energy Program at Duke University's Nicholas Institute for Environmental Policy Solutions is helping to inform those conversations through a series of papers that describe competitive options

In some instances, competition can just mean allowing third parties to build electricity generation within a monopoly utility's territory. For instance, North Carolina's Competitive Procurement for Renewable Energy Program

enables renewables developers to make offers to sell power to electric utilities. By opening up this market and creating a bidding process, third parties can generate clean energy at competitive prices.

At the other end of the spectrum, utilities may join RTOs, formal markets that control member utility transmission systems and centrally dispatch energy. In the early 2000s, at the direction of the Federal Energy Regulatory Commission (FERC), major utilities in the Southeast developed and submitted four proposals for forming regional electricity markets. While most of these proposals did not result in market participation, a Nicholas Institute case study took a look back at them for lessons that could be applied to the current discussions.

Continue the story online at <http://bit.ly/NIAR20-SECompetition>

CATALYST PROGRAM AWARDS

The Nicholas Institute for Environmental Policy Solutions at Duke University is pleased to announce that it has awarded funding to seven research projects for Fiscal Year 2020–2021 through the Catalyst Program.

Now in its fourth year, the Catalyst Program aims to build on the Nicholas Institute’s mission by increasing engagement with Duke faculty to incubate and advance new partnerships, enhance policy-relevant knowledge, and create innovative policy solutions based on new creative synergies.

“More than ever this year, the Catalyst Program promises to live up to its name,” said Tim Profeta, director of the Nicholas Institute. “When our current public health crisis eases and the world is able to safely open up again, we hope that these projects will be in the pipeline and ready to accelerate with our colleagues around the university. We are also proud that more than 80 percent of this year’s funding will go directly to Duke students.”

2020–2021 Catalyst Program Awardees

Mapping Solar Photovoltaic Arrays Using Unpiloted Aerial Vehicles

The team for this project is led by experts in machine learning, interpretation of remote sensing data, and energy access. The project will investigate the use of high-resolution imagery collected by drones for identifying energy infrastructure—such as small solar panels, diesel and gasoline generators, and distribution lines—to support public policy and private investments in sustainable energy access.

Collaborators: Rob Fetter, Nicholas Institute for Environmental Policy Solutions; Jordan Malof, Department of Electrical and Computer Engineering; Kyle Bradbury, Duke University Energy Initiative and Department of Electrical and Computer Engineering; Jay Rineer and Robert Beach, RTI International

Challenges of Using Environmental Social Governance Data to Motivate Action on Climate Change and Planetary Health

Environmental, social, and governance (ESG) data is material for investment firms seeking to leverage capital to promote and privilege sustainable businesses. However, ESG data is, in general, neither reliable, nor transparent. This pre-catalyst grant is intended to design a larger project to 1) understand the underlying issues in producing, reporting, and applying ESG data to motivate

business and financial action on climate change, and 2) develop a framework for an ESG Lab at Duke.

Collaborators: John Virdin, Nicholas Institute for Environmental Policy Solutions; Deb Gallagher and Joseph Bachman, Nicholas School of the Environment; John Buley and Cathy Clark, Fuqua School of Business; Tyler Felgenhauer, Pratt School of Engineering; Lee Reiners, Duke School of Law

Integrating Policy into Duke Restore

Duke Restore is a new initiative of the Nicholas School of the Environment with ambitions to make the school a global leader in ecosystem restoration and cultivation so that this conservation intervention can become a realistic recovery strategy for all ecosystems and economies in the face of intensifying global stress. This project aims to connect the applied research conducted by the Duke Marine Lab through the Restore initiative with the work underway at the Nicholas Institute with policy makers, resource managers, and funders in North Carolina and elsewhere. The goal is to build collaboration to enhance the impact Duke can have on the resiliency of coastal communities to flooding and sea level rise while also enhancing fisheries productivity and biodiversity.

Collaborators: Lydia Olander, John Virdin, and Amy Pickle, Nicholas Institute for Environmental Policy Solutions; Brian Silliman, Carter Smith, Liz Demattia, Pat Halpin, Dan Rittschof, Grant Murray, and Andy Read, Nicholas School of the Environment and Duke Marine Laboratory; Curt Richardson, Nicholas School of the Environment and Duke Wetland Center; Dave Johnston, Nicholas School of the Environment Drone Lab; Steve Roady, Nicholas Institute for Environmental Policy Solutions and Duke School of Law; Dan Vermeer, Fuqua Center for Energy, Development, and the Global Environment

Cross-Disciplinary Policy and Technology Solutions for the Plastic Pollution Pandemic: Creating Connections and Community

This project seeks to build and advance new collaborations to create policy and technology solutions for reducing plastic pollution through a Plastic Pollution Working Group of Duke faculty and students. The idea builds on a pre-catalyst grant awarded to the project team for the 2019–2020 academic year that allowed for production of a manuscript detailing technologies that either prevent plastic leakage or remove plastic from waterways. The report is

part of the Nicholas Institute's upcoming Global Plastics Policy Analysis for the Pew Foundation, providing insight into plastic remediation innovation occurring in the private sector.

Collaborators: John Virdin and Amy Pickle, Nicholas Institute for Environmental Policy Solutions; Meagan Dunphy-Daly, Nicholas School of the Environment; Richard Di Giulio, Nicholas School of the Environment and Duke Superfund Research Center; William Eward, Department of Orthopaedics and Duke Comparative Oncology Group; Kathinka Furst, Duke Kunshan University Environmental Research Center; Andy Read, Dan Rittschof, and Thomas Schultz, Nicholas School of the Environment and Duke Marine Laboratory; Steve Roady, Nicholas Institute for Environmental Policy Solutions and Duke School of Law; Jason Somarelli, Department of Medicine and Duke Comparative Oncology Group; Dan Vermeer, Fuqua Center for Energy, Development, and the Global Environment

Early Stage Development of a Solar Geoengineering Board Game

With climate scientists warning of serious global impacts if greenhouse gas emissions are not quickly curtailed, some nations may forego attempts at international cooperation and instead seek to address climate change using geoengineering technology, such as solar radiation management (SRM). Because it is expected to be relatively cheap and fast-acting, solar geoengineering could be deployed by a single nation desperate to avoid the worst impacts of climate change, but this action may be detrimental to other nations and may undermine the global motivation for emissions abatement. This project will design and beta test a board game that will give players the opportunity to experience the complexities that solar geoengineering introduces into the geopolitical dynamics of climate policy.

Collaborators: Mark Borsuk, Jonathan Wiener, and Tyler Felgenhauer, Duke Center on Risk; Billy Pizer, Nicholas Institute for Environmental Policy Solutions and Sanford School of Public Policy; Shai Ginsburg, Duke Game Lab; Max Cawley, Museum of Life and Science; Christine Ogilvie Hendren, Team Helium LLC; Chris Cummings, Decision Analytica LLC

An Analysis of the Industrial "Opt-Out" Challenge

The Energy Information Administration reports that in 2018 industrial cus-



tomers consumed 33 percent of all primary energy and 26 percent of electricity in the United States, representing a large energy efficiency resource opportunity. This project will utilize a combination of non-public microdata from the U.S. Census and publicly available data to compare the energy usage of industrial customers that "opt-out" of electric utility energy efficiency programs with those that stay "opted-in" to determine the value and potential opportunity of utility-offered energy efficiency and demand response programs.

Collaborators: Gale Boyd, Duke Social Science Research Institute; Jen Weiss and Rob Fetter, Nicholas Institute for Environmental Policy Solutions; Xirui Zhang, Economics Department

Understanding and Controlling Urban Soil Lead Contamination and Its Impact on Public Health

Lead exposure remains a significant public health concern, despite impressive reductions in the United States over the past 40 to 50 years. Regulatory efforts have limited exposures in workplaces, schools, homes, and in the outdoor urban environment, but challenges to curbing human lead exposure persist, including our limited understanding of lead contamination in urban soils. This project creates a diverse team with expertise in soil chemistry, toxicology, epidemiology, environmental health sciences, pediatric and family medicine, community health, and public policy to coproduce policy-relevant research and to identify best practices for governmental actors to address lead exposure hazards from urban soils.

Collaborators: Kay Jowers, Nicholas Institute for Environmental Policy Solutions; Dan Richter, Anna Wade, and Kate Hoffman, Nicholas School of the Environment; Nancy Lauer and Michelle Nowlin, Duke Environmental Law and Policy Clinic; Nrupen Bhavsar, Department of Medicine, General Internal Medicine; Jillian Hurst, Children's Health & Discovery Initiative at Duke University; Lloyd Michener, Family Medicine & Community Health; Christopher Timmins, Economics Department

SELECT PUBLICATIONS

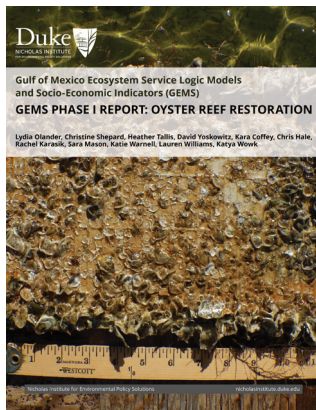
Mapping Ecosystem Services for the Southeast United States

Ecosystem Services began a new series of methods briefs on mapping ecosystem services in the Southeast United States. Four have been published so far, with more to come. The briefs focus on **wild pollination**, which is beneficial to the production of many pollinator-dependent crops; **access to recreational open space**, which is a key component of mental health and well-being; on **recreational birding**, which maps the location of recreational birding activity in the southeastern U.S.; on **water purification by natural land cover**, which removes nonpoint-source pollutants from runoff water before they reach waterways. Spatial datasets for these priority areas and associated metrics are available on ScienceBase.

GEMS Phase I Report: Oyster Reef Restoration

While there are existing efforts to collate and standardize ecological and biophysical metrics for Gulf restoration projects, there is no current effort to do the same for the social, economic, and human well-being outcomes of restoration. This project aims to do that.

The GEMS team will develop ESLMs and metrics for a wide range of coastal restoration approaches over the course of the project. This report presents the results of the first phase of the GEMS project, which focused on oyster reef restoration.



Vehicle Electrification: Coordinating Transportation and Power Sector Policies to Maximize Air Quality Benefits

This policy brief looks at the likely electricity demand from projections of personal electric vehicle uptake in the United States, and then suggests power sector policies to ensure reductions in air pollution from this sector even while demand increases from transportation.

Lessons for Modernizing Energy Access Finance, Part 1: What the Electrification Experiences of Seven Countries Tell Us about the Future of Connection Costs, Subsidies, and Integrated Planning

This policy brief explores the successful rural electrification experiences of seven case countries—looking specifically at the cost of connections and how subsidies and public financing were deployed to address the affordability challenge and facilitate energy access. The analysis finds that connecting rural customers has been costly—far more than the cost of distributed systems today. Maintaining these public investments and adapting funding mechanisms to address the unique nature of the off-grid sector, will dictate the extent to which distributed systems are able to scale in the coming decade.

COVID-19 Impacts on Water Utility Consumption and Revenues: Preliminary Results

Preliminary data from five water utilities of different sizes and different climates across the U.S. show variable impacts to consumption and billed revenue in response to the global pandemic. Some utilities saw a decline

in primarily non-residential consumption of up to 19% and non-residential billed revenue of up to 8% in April, one full month into the pandemic, relative to April usage and revenue in the past three years. For some utilities, consumption and revenues remained similar to previous years.

Ensuring Water Quality: Innovating on the Clean Water & Safe Drinking Water Acts for the 21st Century

The 2019 Aspen-Nicholas Water Forum explored the concept of innovating the Clean Water and Safe Drinking Water Acts for the 21st Century and the ideas that undergird these two acts, their successes, shortcomings, and unintended consequences. The central question was how can innovation and regulation at local, state, and federal levels address chronic and emerging water quality challenges across the U.S.?

Compensatory Mitigation on Federal Lands

This report represents an examination of compensatory mitigation of aquatic resources on U.S. federal lands through an examination of case studies and a review of the legal landscape in which such mitigation takes place. The authors present a series of considerations and recommendations that should be taken into account as federal agencies begin formalizing policies regarding compensatory mitigation on their lands. Some of the issues identified with compensatory mitigation on federal lands drawn from case studies presented here may represent outliers, but are nevertheless important to emphasize so that, as policies for these processes are institutionalized, such issues can be addressed accordingly.

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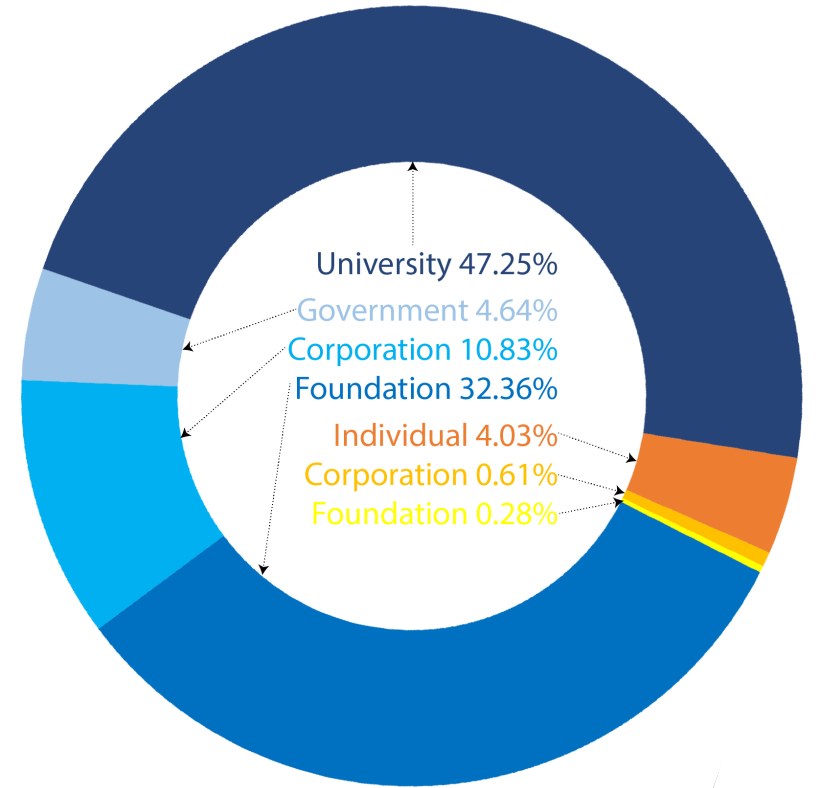


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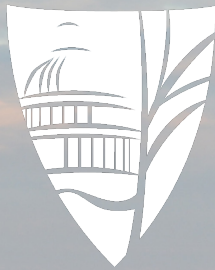
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