

Campus Sustainability Report 2023

University of North Carolina at Chapel Hill



THE UNIVERSITY
of NORTH CAROLINA
at CHAPEL HILL



INSTITUTE FOR
THE ENVIRONMENT



Sustainable
Carolina

“As a leading global public research university, we know the importance of environmental stewardship and what’s at stake if we don’t act swiftly. Our students, faculty and staff have long been committed to creating a more sustainable Carolina.”

Chancellor Kevin M. Guskiewicz

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From the Sustainable Carolina Team

This year we celebrated three years of Sustainable Carolina. Housed within the UNC Institute for the Environment, our group aims to connect operations, research and academics at the University. Guided by the Carolina Sustainability Council, we strive to create partnerships and implement innovative strategies that advance Carolina's sustainability goals. This report highlights the excellent work of students, staff and faculty during the 2022-2023 school year.

As Carolina's hub for sustainability, we would love to hear your sustainability success story. The sustainability report is updated annually in the summer. Contact us to have your work included in a future report.



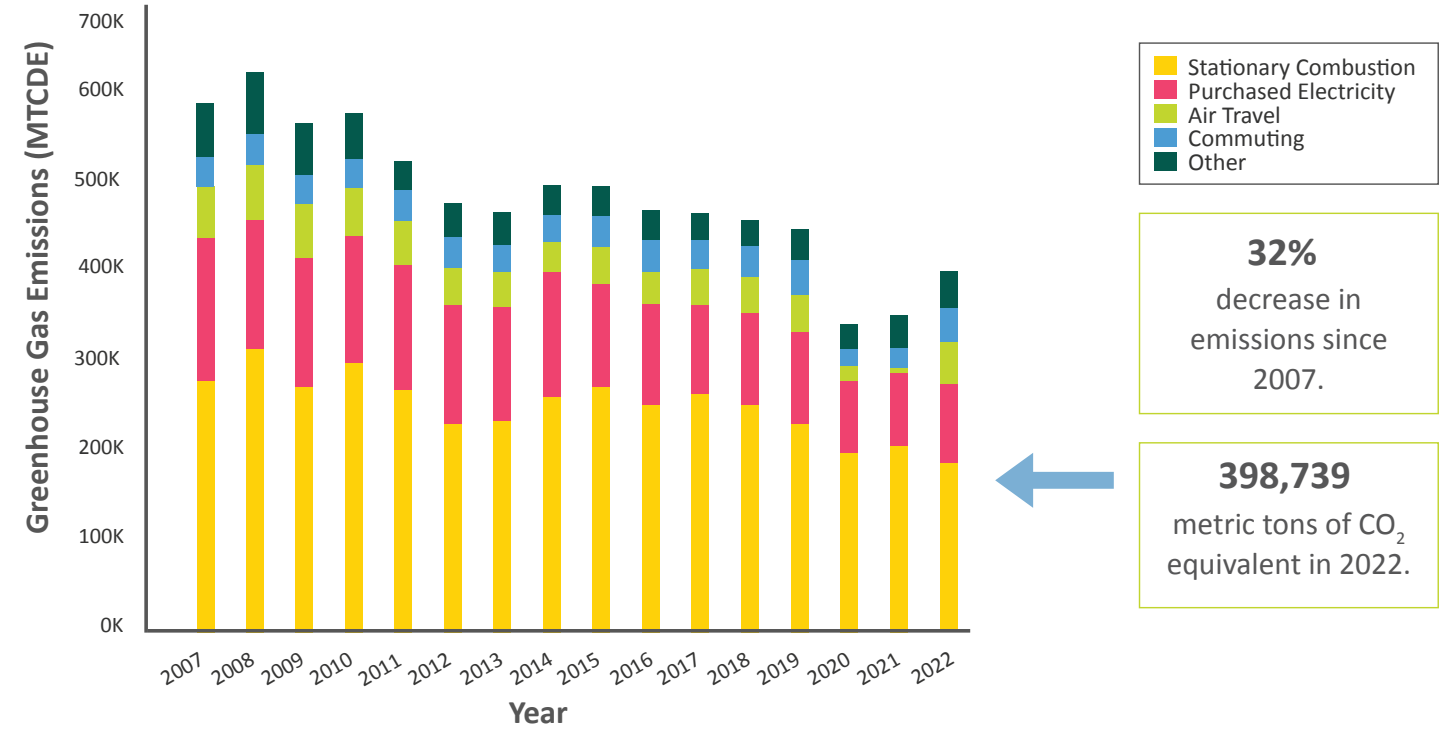
Greenhouse Gases | By the Numbers

Sustainable Carolina's annual GHG report breaks down campus emissions and illustrates the strides UNC-Chapel Hill is making toward its 2040 carbon neutrality goal. The report uses 2007 — the year Carolina began robust tracking of GHG emissions — as the baseline year.

Since that baseline year, greenhouse gas emissions are down 33%. In 2007, the University emitted 589,237 metric tons of MTCO₂e equivalent and in 2022, Carolina emitted 398,739 MTCO₂e.



UNC-Chapel Hill is a signatory of Second Nature's Carbon Commitment and the Alliance for Sustainability Leadership in Education's Race to Zero.



Improving Energy Efficiency

Carolina is continuously improving campus building efficiency. UNC Energy Management has made improvements to its energy dashboard, allowing users to select different timeframes and locations. This in turn gives users the power to make detailed usage charts. Proper energy conservation can reduce campus emissions by minimizing the amount of steam, chilled water and electricity used by campus.

Exploring Renewable Energy

Carolina is increasing on-campus solar generation and engaging with partners around utility-scale renewables. The University prioritizes high-impact cost-effective projects and programs.



64% reduction in coal consumption.

Coal and natural gas are used at the cogeneration plant to produce steam. Steam is generated by stationary combustion at the cogeneration plant. Steam is critical for campus laboratories and hospital operations. During the pandemic, hospital steam use increased, but emissions from generated steam decreased.



44% reduction in purchased electricity emissions.

Stationary combustion not only produces steam, but also a small amount of electricity. We purchase most of our electricity from Duke Energy, but 15-20% is a byproduct of cogeneration. To further decrease our reliance on purchased power and mitigate emissions, Carolina is investing in solar generation on campus.



18% reduction in electricity consumption, per square foot.

Through UNC Energy Management's successful energy conservation management program and building optimization program, energy efficiency has increased on our growing campus. The University is also working to update building design guidelines to ensure new construction is as efficient as possible.



14% reduction in fleet emissions.

The UNC Department of Fleet Services is the hub for UNC-owned and -leased vehicles and equipment. Through mileage reduction, more efficient vehicles and increased biofuel use, the University has dramatically decreased fleet emissions.



24% increase in commuting emissions.

With more students, staff and faculty traveling to campus post-pandemic, commuting emissions increased in 2022. This increase is like the increase we saw prior to the pandemic, which resulted from more employees driving alone to campus.

Vehicle Emissions

Chapel Hill is fortunate to have a fare-free bus system, with three electric buses and eight more on the way. UNC Transportation and Parking's Commuter Alternative Program incentivizes students, staff and faculty to commute using buses, and other alternative forms of transportation. By joining, participants can access free regional bus passes and discounts to local businesses.

For those driving electric vehicles, the University has six EV charging stations across campus, with more planned for installation in the coming years.

Optimizing Operations

When the pandemic disrupted typical campus operations, Carolina’s operational units continued to develop plans and implement projects to bring Carolina closer to its sustainability goals. This section explores activities and metrics related to campus greenhouse gas emissions, water sustainability and waste reduction.

Climate Action at Carolina

Sustainable Carolina published its new [Climate Action Plan](#) in 2021, after implementing 75% of the near-term strategies described in the 2009 plan. Carolina strives to achieve the energy efficiency goal set by [Executive Order 80](#), a 40% reduction in energy use intensity (EUI) of state-owned buildings by 2025. Through the efforts of [UNC Energy Management](#) and construction of more energy efficient buildings, Carolina has decreased energy use per square foot of building space by 37% since 2003.



The Champion Sustainability Fund encouraging students, faculty and staff to dream up sustainable solutions that benefit Carolina and the wider community. (Photo by Jeffrey A. Camarati)

Champion Sustainability Fund

In summer 2023, UNC Athletics announced the first Champion Sustainability Fund project. Through a partnership with Sustainable Carolina, [Carmichael Arena](#) and [Kenan Stadium](#) received new LED lights and video boards. These features will enhance the game day experience for teams and spectators while also decreasing energy consumption and increasing the historic building’s overall efficiency.

This partnership with UNC Athletics grew out of networking by Carolina students in a capstone course. Throughout the course, students identified possible energy and water efficiency projects that aligned with the Fund.

The Champion Sustainability Fund is Carolina’s green revolving fund made possible by a \$1 million gift from Hanesbrands’ Champion Athleticwear.

Emissions Tracking

Carolina uses the Sustainability Indicator Management & Analysis Platform (SIMAP®) to [calculate greenhouse gas emissions for campus](#). Through SIMAP’s public reporting tool, anyone can search an institution and see a breakdown of total emissions and trends, along with climate commitments and goals.

Additionally, visitors to the Sustainable Carolina website will find dashboards for energy efficiency, water use and waste generation on campus.



Campus Water Footprint

In 2022, Sustainable Carolina released a [Water Plan](#), describing the University's water sustainability accomplishments and goals. Source water management strategies implemented by the University minimize stormwater runoff pollution and improve water efficiency on campus. Sustainable Carolina collaborates with campus partners and our water utility, [OWASA](#), to further best practices in water sustainability.

Campus Water Footprint

Potable water consumption per square foot has decreased 61% from the 2003 baseline. The University uses non-potable water for things like irrigation and toilet flushing, when possible. This non-potable water comes from OWASA’s [reclaimed water utility](#) or Carolina’s own underground cisterns, which capture water during rain events.

UNC Energy Services and Energy Management use [OWASA’s AguaVista software](#) to identify leaks and buildings using high quantities of water. This data can help the University improve water efficiency.

UNC Stormwater Program

The [UNC Stormwater Program](#) is housed in UNC Environment, Health and Safety. UNC-Chapel Hill has a stormwater permit issued by the NC Department of Environmental Quality, which regulates discharges on campus.

Under the permit, UNC Stormwater must participate in public education and outreach. The group has worked with Sustainable Carolina to arrange cleanups near stream outfalls on campus. The permit also sets standards for construction projects. Any project on campus that removes ground cover or exposes soil must follow best management practices to reduce erosion and prevent sediment from landing in surface waters. Once buildings are constructed, stormwater control measures must be implemented in these new spaces to improve water quality, control runoff and decrease flooding during rainstorms.

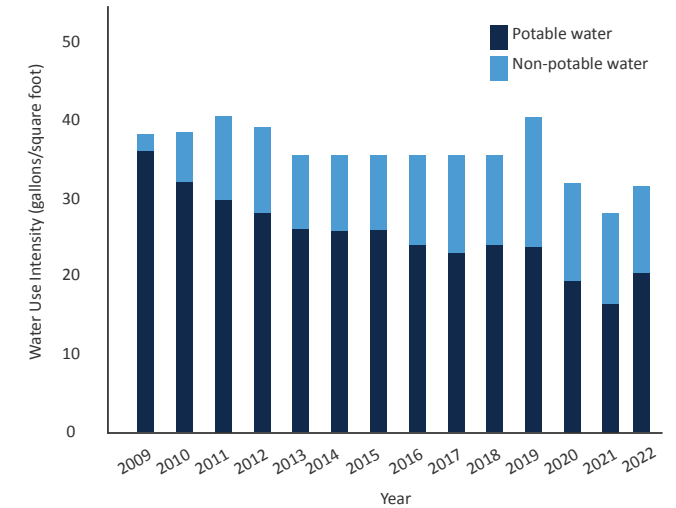


Figure 1: Water use on campus, in gallons per square foot, over a 14-year period.



A thousand water-loving plants were planted in and around a wetland at the Friday Center. Wetlands are one type of stormwater control used on campus. The Friday Center also utilizes [permeable ground cover](#).



This aerial view of the LEED Gold certified Mary Ellen Jones building shows another stormwater control measure — a green roof. The area provides green space in the middle of campus (photo by CARDNL).

Waste Recovery

During the 2022-2023 school year, the [UNC Office of Waste Reduction and Recycling](#) (OWRR) reported that xx% of campus waste was sent to the landfill and xx% was recovered (recycled or composted). In 1990, the recovery rate was just 12%. Departments and organizations across campus continue to improve waste recovery.

Move-In Recycling Support

During move-in weekend, students come to campus with cardboard boxes of all sizes. OWRR makes loops of campus to let students know these cardboard boxes can be recycled. OWRR also assists in the breakdown of boxes and makes sure that there is enough room in recycling bins for boxes.



During move-in weekend the Office of Waste Reduction and Recycling makes rounds on campus to ensure cardboard boxes are being broken down properly for recycling.

Residence Hall Waste

Plastic film, like grocery bags, can be recycled at the front desk of each residence hall. [Carolina Housing](#) residents can also check out a small, airtight compost bucket from their community. The small buckets are emptied into large carts; carts are emptied weekly, and contents are sent to a local facility.

Move-Out Donations

Carolina Housing partners with TROSA, Carolina Thrift and UNC OWRR to host “[Don’t Ditch It, Donate It!](#)” The annual program runs from April to mid-May and provides donation bins for clothes, furniture, school supplies, non-perishable food and more. In 2023, the program led to 13.5 tons of item donations and 160 pounds of food donations for Carolina Cupboard.

Eat Sort Win Dining Campaign

[Carolina Dining Services](#) (CDS) is Carolina’s chef led, student-focused dining operation. Through the Student Dining Board, CDS communicates with the student body, giving them a say in food purchasing, meal plans, budgets and more. With a full-time sustainability manager, CDS [promotes consumer awareness and responsibility](#) through food waste messaging. Programs like “Wipe Out Waste” and “Pick Your Portion,” encourages students to think before they take food from buffet lines. Additionally, every month CDS completes a composting and recycling audit in its main dining location to determine contamination rates.

Campus Operations Partners

Sustainable Carolina works with a variety of partners across campus. This list is not exhaustive.

- [UNC Finance and Operations, Facilities Services \(Includes Operations, Engineering and Construction, Planning and Design, Energy Management, Grounds\)](#)
- [UNC Finance and Operations, Energy Services](#)
- [UNC Finance and Operations, Auxiliary Services](#)
- [UNC Institutional Integrity and Risk Management, Environment Health and Safety](#)
- [UNC Student Affairs](#)

Curricula

Carolina’s experiential education programs offer students structured, dynamic learning opportunities that invite them to apply their knowledge and skills in real-world environments.

College of Arts & Sciences

In 2022, Jim White [became the inaugural Craver Family Dean of the College of Arts and Sciences](#). White is an internationally-renowned expert in climate science, with approximately 200 peer-reviewed journal articles. He is a faculty member in the Department of Earth, Marine and Environmental Sciences.

Department of Earth, Marine and Environmental Sciences (EMES)

In 2021, the departments of geology and marine sciences, along with the Institute for Marine Science (IMS) became grouped under the new EMES department. Students can major in geology (earth science concentration or environmental geoscience concentration). They can also minor in geological sciences or marine sciences. The minor is open to any interested undergraduate student. Field work at the Institute for Marine Sciences is encouraged for the minor.

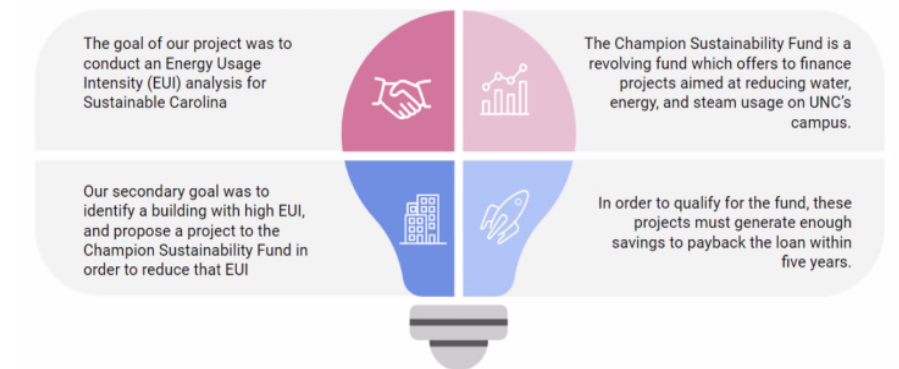
Environment, Ecology and Energy Program

Through the [Environment, Ecology and Energy](#) (E3P) program, students can major in environmental sciences (B.S.) or environmental studies (B.A.). Students pursuing a different major can pursue a [minor in sustainability](#). The two environmental major options and sustainability minor option all incorporate natural sciences, social sciences and humanities to teach students how to manage resources in our ever-changing world. E3P also accepts graduate students (M.A., M.S., Ph.D.).

E3P Capstone Course

In fall 2022, Sustainable Carolina [served as the client for E3P’s capstone course](#), ENEC 698: Analysis and Solution of Environmental Problems, taught by Léda Van Doren. Van Doren split the class into three groups to analyze data in three different areas: electricity, HVAC/steam/chilled water and water. Sustainability Analyst Melanie Elliott guided students through the process, explaining how to collect and analyze data, and locate outliers. Identifying outliers is a critical part to creating a more efficient campus. At the end of the semester, students were encouraged to submit proposals for the Champion Sustainability Fund, Carolina’s green revolving fund.

Our Project



A slide from an ENEC 698 capstone final presentation explains the goals of the semester.

Sustainable Triangle Field Site

Mike Piehler, Toni Sebastian and Melanie Elliott led the spring 2023 Sustainable Triangle Field Site capstone course. The students [titled their final project](#), *Climate Hazards in Chapel Hill: Urban Heat Island Effect and Green Infrastructure Mitigation on Campus*. Their work focused on three main aspects. Looking at the FedEx Global Education Center green roof, the group measured illuminance and temperature. At Battle Grove regenerative stormwater conveyance system, they examined water quality through a variety of instruments. Lastly, the group gave sustainable design recommendations for the University's future Porthole Alley project.



Sustainable Triangle Field Site students out in the field taking water quality measurements of campus streams. In the coming years, Sustainable Carolina hopes to build a robust database to track campus stream quality.

UNC Department of Geography and the Environment

In 2023, the UNC Department of Geography became the UNC Department of Geography and the Environment, to better reflect the scope of its teaching and research. The department's five concentrations include: earth and environment; geographic information science and geovisualization; nature and society; international development and globalization; and culture, space and identity. A group of students from Associate Professor Javier Arce-Nazario's class [created the Carolina Cartography Collective](#), to contribute to mapping research. [Geovisualizing Vieques](#), the group's first major project, examined how the Puerto Rican landscape has evolved throughout the past 150 years.

UNC Hussman coursework wins honors

At the prestigious 2023 Society for News Design International Student competition, two student teams [tied for first place in the digital storytelling category](#).

Living Galapagos, created by students in MEJO 584: International Projects, [traveled to the Galápagos Islands](#) to explore different topics, including marine ecosystems, terrestrial ecosystems, governance, tourism and culture. Students from the 2022 Carolina Photojournalism Workshop created *Where Rivers Meet*, the other competition winner. The group traveled to Asheville, Black Mountain and surrounding communities to [examine tourism, eco-villages, economic development and more](#) in Western North Carolina.



Poster for April 2022 Living Galapagos Screening at Fed Ex Global Education Center.



Carolina Photojournalism Workshop 2022 students test cameras before interviewing subjects (photo by UNC Visual Communication).

UNC School of Data Science and Society

Launched in fall 2022, the [UNC School of Data Science and Society](#) will launch its first degree program, an online master of applied data science, in January 2024. Ultimately, the School will allow undergraduate, graduate and professional students to pursue data science degrees. Utilizing a human-centric approach with an emphasis on ethics, students will have multiple avenues to incorporate data science courses into their respective degrees.



"We are beginning to understand more about the realities of how **biology** works, the realities of how **waterways** are intersected with our **energy** supply, that they are intersected with our ability to **grow sufficient food** to be able to thrive. To understand how our **gut microbiome** might be affected by our ability to grow that food. All these things are **data**. That makes data a particularly potent metaphor for reality."



UNC School of Data Science and Society Dean Stanley Ahalt

Gillings on the Ground

Hannah Lineberger, director of the [Gillings on the Ground program](#) says she thinks people are "recognizing that disasters are becoming an increasing threat and want to be proactive in their response." The Gillings on the Ground Program is a free, two-semester training program that teaches participants about volunteering in disaster situations, creating disaster preparedness plans and more. The program runs September through April every year. In fall 2022, more than 100 participants from schools and community organizations across the state and beyond completed the training. In addition, 24 participants went through the hands-on hazardous materials (hazmat) training from the Duke Healthcare Preparedness Coalition in spring 2023.



Gillings on the Ground students gather around a HAZMAT demonstration in Durham (photo by UNC Gillings School of Global public health).

Walking Tours

Sustainable Carolina leads sustainability and stormwater tours regularly. These tours are open to interested individuals as well as entire classes. In 2022 and 2023, Sustainable Carolina partnered with UNC Exercise and Sports Science to lead students taking the Lifetime Fitness (LFIT) course down the Campus-to-Garden Trail for a nature walk. During the walk, Sustainable Carolina team members identified invasive species and discussed stream ecology with students.

Experiential Education

Carolina’s experiential education programs offer students structured, dynamic learning opportunities that invite them to apply their knowledge and skills in real-world environments.

The EcoStudio

[The EcoStudio](#), a partnership between E3P and the UNC Institute for the Environment, matches students with internships at the University and in the local community. Students explore energy, sustainability, environment, policy, planning and more through research and projects at their placements.

In spring 2023, a Sustainable Carolina intern created a computer-based video game to promote sustainability on campus. Users play as Rameses, learning about energy efficiency, recycling and water conservation. Along the way, players complete challenges while a snyth version of “Hark the Sound” plays in the background.



In developing a sustainability-themed video game, Sustainable Carolina’s EcoStudio intern tested the game with classes and students.

Sustainable Tar Heels Internship Program

Sustainable Carolina launched its Sustainable Tar Heels internship program through EcoStudio in spring 2022. The fall 2023 group includes a communications intern, two research translation interns, a Commuter Alternative Program intern and a Green Office intern. Through their internship work and opportunities to connect with students through tabling events, the interns will gain professional skills and a better understanding of how university sustainability initiatives work.

Field Sites

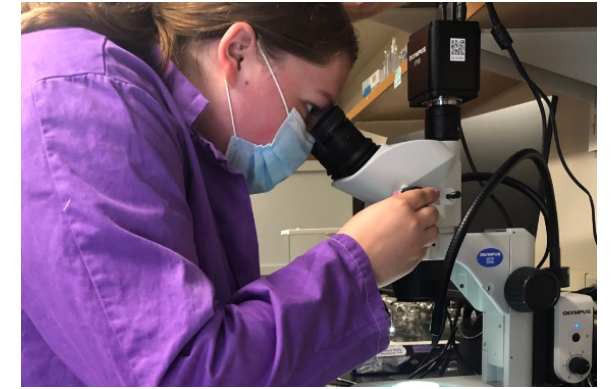
UNC Institute for the Environment and E3P have [field sites in North Carolina and abroad](#). UNC Study Abroad coordinates the programs, with the exception of the Sustainable Triangle Field Site.

UNC INSTITUTE FOR THE ENVIRONMENT FIELD SITES

Semester	Field Site	Location	Concentration Areas
Fall	Highlands Field Site	NC Mountains	Ecology and environmental infrastructure
Fall	Outer Banks Field Site	NC Coast	Decision making and environmental infrastructure
Fall	Morehead City Field Site	NC Coast	Ecology, Earth system science, environment and health
Spring	Sustainable Triangle Field Site	Urban NC	Sustainability and environmental infrastructure
Spring	Thailand	Urban/Tropical	Energy, environmental infrastructure, sustainability

Microplastics Research at Highlands Field Site

Sophie Hall [won the Excellence in Sustainability prize](#) at the 2023 Celebration of Undergraduate Research. Her research examined microplastics in the Highlands, where she first spent a semester in 2021. Through a Summer Undergraduate Research Fellowship (SURF), she returned in 2022. Hall collected water samples from the Cullasaja River and its watershed during storm events. Similarities between collected rainwater and river water indicated that there may be microplastics in rain droplets. The work also found that there could be high levels of microplastics throughout the watershed.



Hall analyzes a water sample in the lab.

Algal blooms, landfill leachate and King Tides at UNC IMS

In fall 2022 at the UNC Institute of Marine Sciences (IMS), 11 students took part in independent study projects. Three of these students worked on projects related to water sustainability. Two students worked with the Paerl Lab to on projects related to algal blooms. Algal blooms, which release harmful chemical toxins, negatively impact water quality. Meg McCartney ’23 looked at whether leachate from landfills may cause algal blooms. Meanwhile, Madison Milote ’24 examined a strategy for curbing algal blooms after they happen. Another student, Caroline Chen, worked in the Noble Lab studying the impact of extreme tides, known as King Tides, which overwhelm and impact stormwater discharge systems in Atlantic Beach.



Milote and McCartney inject leachate into containers during thier field site work (photo by [Morehead City Field Site](#)).

UNC Research team travels to the Highlands Field Site

UNC Institute for the Environment is one of 13 research centers and institutes within the [Office of the Vice Chancellor for Research](#). UNC Research Communications is responsible for conveying the value of research at Carolina; the group [publishes an online magazine, Endeavors](#). In January 2023, the UNC Research communications team made their way to the Highlands Field Site to report on the unique work of researchers and students there. UNC Research published four stories from the trip, exploring the creatures in western North Carolina and research being done to further conservation in the region. UNC Research published stories, photos and video of [big brown bats](#), the [Blue Ridge two-lined salamander](#), [Carolina hemlock trees](#) and [rodents](#).



Kristina Hefferle looks for the male Blue Ridge two-lined salamander under a footbridge in the botanical garden of the Highlands Biological Station (photo by Andrew Russell).



Mice are one of the most common animals researchers capture and tag to assess wetland mitigation and rehabilitation impacts on small mammals. (photo by Andrew Russell).

Research & Innovation

As one of America's top research universities, Carolina conducts [more than \\$1 billion in sponsored research annually](#). Sustainability is a theme throughout much of this research, which pushes North Carolina, our country, and the world forward in mitigating the causes and effects of anthropogenic change.

Ackerman Center For Excellence

Kenan-Flagler Business School [broke ground on Steven D. Bell Hall](#) in fall 2022. It will eventually house the Ackerman Center for Excellence in Sustainability (ACES). The building will meet LEED Gold standards by incorporating solar panels, open-air terraces, large windows, green spaces and energy efficient lighting.

In spring 2023, ACES celebrated Earth Week with three awards:

- [Distinguished Business Award](#): FlexGen
- [Distinguished Alumnus Award](#): Nike Senior Director of Sustainability Analytics Bennett Wetch
- [Distinguished Entrepreneurial Venture Award](#): Green Heffa Farms



Chancellor Kevin Guskiewicz speaks at the groundbreaking ceremony for Bell Hall.

Energy Transition Initiative

Launched in 2022, the [Energy Transition Initiative is a partnership](#) between the UNC Institute for the Environment and UNC School of Law's [Center for Climate, Environment, Energy and Economics](#). In 2023, ETI interim director Alex Hopkins, along with the Sustainable Carolina team, joined UNC Student Government Undergraduate Executive Branch for the first-ever Energy Transition Town Hall. The event gave students an opportunity to ask about the University's greenhouse gas emissions, Climate Action Plan and work toward a smooth transition to more renewable energy.

Environmental Finance Center

For 25 years, the [Environmental Finance Center](#) (EFC), within the UNC School of Government, has worked to address the financial aspects of environmental protection and service delivery. The systems EFC focuses on – drinking water, wastewater and stormwater – require daily upkeep and larger renovations throughout their lifetimes. Paying for these services impacts everyone, from governments to communities to individuals. This year, Project Director Hope Thomson and Graduate Research Assistant Delia Wegner [examined the challenges individuals face in paying for their water](#). They looked at Customer Assistance Programs, which help customers afford basic utilities, like water. They assessed programs across the country to learn what other states are doing. They also examined how strategies like improving wording in the letters water utilities send to customers regarding payment deadlines.

The Water Institute

The Water Institute's [UNC Water & Health Conference](#) has been running for 13 years, with the 2023 conference set for October 23-27. Every year, policymakers, practitioners and researchers gather to think about how to improve old approaches and develop new approaches to expanding water, sanitation and hygiene access and services.

Department of Geography and Environment

In 2023, the Department of Geography added environment to its official name, emphasizing the department's focus on the most pressing environmental issues. Its researchers are examining things like how sea level rise will impact the Florida Keys and the disproportionate impact climate change will have on those living in poverty.

Amanda DeVecchia, assistant professor and Voit Gilmore Fellow, [spoke at Sustainable Carolina's April Sustainability Research Symposium](#). She talked about her lab's work to understand greenhouse gas flux in streams, a process that can emit greenhouse gases into the atmosphere.

Department of City and Regional Planning

In 2022, North Carolina Sea Grant [funded Miyuki Hino's work on chronic flood hazards in coastal communities](#). The research takes place at Carolina Beach and explores the drivers of flooding, captures water levels in flood prone areas, established an early warning system for flooding and collaborates with community members to define flood mitigation strategies.

Hino is also the contact for the Department of City and Regional Planning's unique [certificate in national hazards resilience](#).



Two graduate students from DeVecchia's lab sample greenhouse gases at New Hope Creek (photo by Amanda DeVecchia)



Two graduate students sample greenhouse gases at New Hope Creek.

Carolina Sustainability Council (2022 - 2023)

Chancellor Guskiewicz established the Carolina Sustainability Council in 2020. The Council paved the way for the creation of Sustainable Carolina and meets every quarter to discuss the University's sustainability initiatives and how they tie into Carolina's strategic framework.

Faculty Members

- Mike Piehler, Chief Sustainability Officer and Director of the UNC Institute for the Environment
- Elizabeth Havice, Professor, Department of Geography
- Nikhil Kaza, Associate Professor, Department of City and Regional Planning and Environment, E3P
- Jeff Mittelstadt, Professor of the Practice of Strategy and Entrepreneurship and Executive Director, Ackerman Center for Excellence in Sustainability
- Jonas Monast, Distinguished Assistant Professor and Director, Center for Climate, Energy, Environment and Economics, UNC School of Law
- Natalie Murdock, Murdock Anderson Consulting and Senator, North Carolina General Assembly
- Erin Riggs, Executive Director, Environmental Finance Center, School of Government
- Aaron Salzberg, Distinguished Professor and Director, Water Institute, Gillings School of Global Public Health
- Julie Jacobson Vann, Clinical Associate Professor, UNC School of Nursing

Student Members

- Ileana Fenwick, Doctoral Candidate, Department of Earth, Marine and Environmental Sciences
- Ideliya Khismatova, Co-Chair, Renewable Energy Special Projects Committee (RESPC)
- Ella Feathers and Jacob Crawford, co-directors of department of environmental affairs

DataDriven EnviroLab

The DataDriven EnviroLab (DDL) released its [2022 Global Climate Action Report](#), analyzing the climate commitments of various cities and companies. DDL Director Angel Hsu [spoke about the report at COP27](#). In spring 2023, DDL added 118 countries to its [Urban and Environment Social Inclusion Index \(UESI\)](#), which measures cities' progress in making urban areas more sustainable and inclusive.

Leibfarth Lab

Frank Leibfarth, assistant professor in the Department of Chemistry, studies polymers, specifically – polyolefins. Within this group of plastics are those that are used to make plastic milk jugs and bags. Leibfarth and his lab are [developing reagents](#) to effectively recycle these types of plastics. Instead of downcycling, Leibfarth aims to make plastics more valuable than they were in their milk bottle and plastic bag forms. This work has received a great deal of media attention.



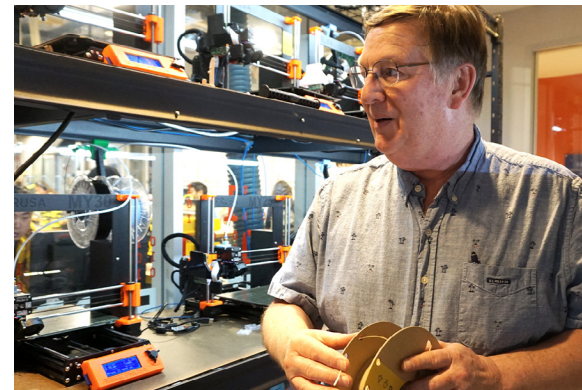
Erik Alexanian, Frank Leibfarth, Eliza Neidhart and Austin Miller strike a pose in the lab (photo by Jon Gardnier/UNC-Chapel Hill).

Applied Physical Sciences

Louis D. Rubin Jr. Distinguished Professor [Jinsong Huang](#) leads a research team at Carolina that's working to [improve the performance of perovskite solar cells](#). The team strengthened the composition of the solar cells and tested indoors, employing tools to imitate the sun's rays. The lab is currently working on outdoor testing of perovskite efficiency.

BeAM Makerspaces

Sustainable Carolina partnered with BeAM to [introduce a new, sustainable 3D printing filament](#). The filament, allPHA, is made up of polymers; each of the polymers are created via fermentation by bacteria. Because of this, the material is biodegradable. This is a big deal because 3D printing creates a lot of waste. In the future, BeAM hopes to purchase a grinder to mechanically break down failed allPHA projects. This would jump start the decomposition process.



Glen Walters holds a spool of the sustainable filament in BeAM Murray's room of 3D printers.

North Carolina Collaboratory

Water system infrastructure not only ensures residents have clean drinking water, but also protects our natural environment, especially rivers and streams. The North Carolina Collaboratory teamed up with the UNC Environmental Finance Center to [create the Highly Treated Wastewater program](#). The program is currently providing funding to five rural towns in North Carolina so that they can update their water infrastructure. The program also aims to improve the water quality of effluent leaving plants and entering rivers and streams.

Campus Drinking Water Safety

The 2022-2023 school year brought the unwelcome news that lead was discovered in multiple drinking fountains across campus. UNC Environment, Health and Safety turned to Rebecca Fry at Gillings School of Global Public Health to [gather student volunteers](#) to help test the thousands of sinks and drinking water stations across campus. UNC-Chapel Hill adopted a “no lead tolerance policy,” in which fixtures that were found to have lead in them were deemed out of order until replacement parts were installed. Testing wrapped up during the spring 2023 semester.

Grant Spotlight: Islands in the Sky

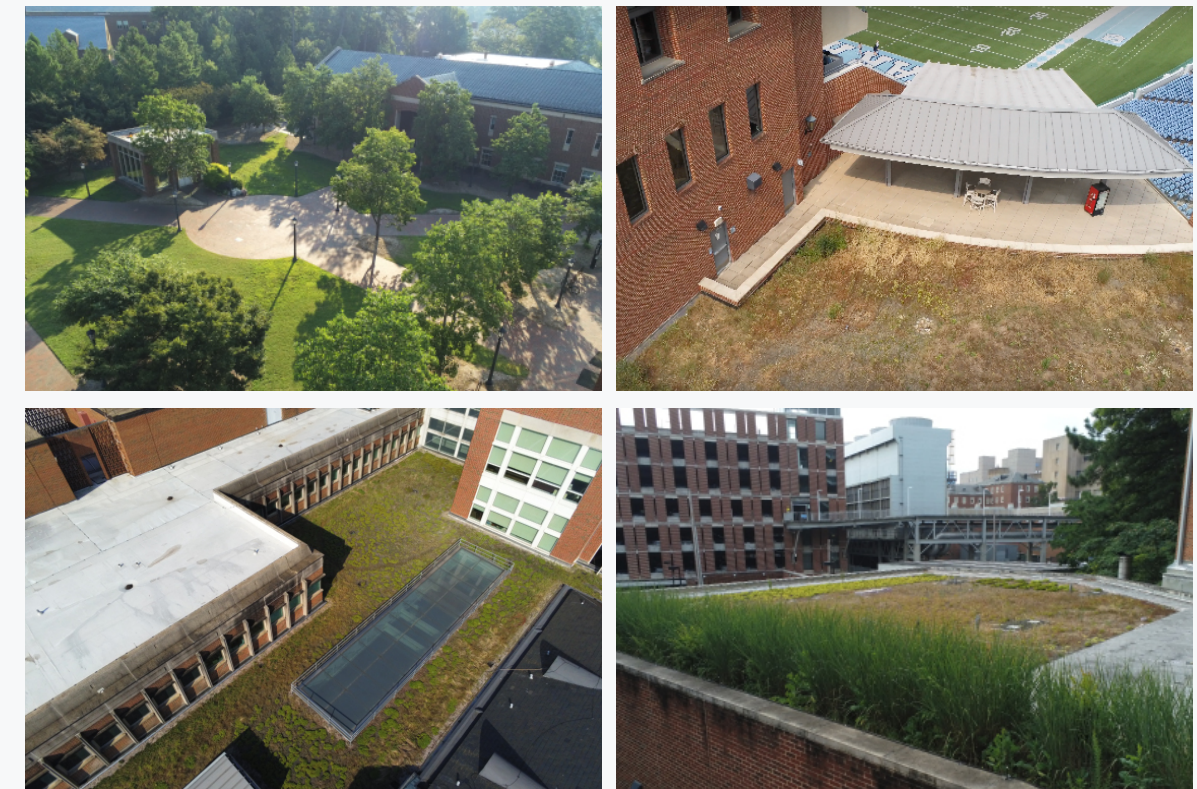
In 2022, [Carolina Drone Lab \(CARDNL\)](#) received a [UNC Center for Faculty Excellence/Lenovo grant](#) to map and assess Carolina's eight campus green roofs. The project, in partnership with Sustainable Carolina and EcoStudio, aims to shine a light on innovative installations, promote green infrastructure on campus and test drone technology as a way to monitor plant health on green roofs.



Peggy Mullin, a research assistant with Carolina Drone Lab, talks with her intern about one of the drones during a [Free Fly Friday](#).

Green roofs promote sustainability and energy efficiency on campus. The plants on our campus green roofs retain some of the rainwater from storms. Additionally, the green roof systems route some rain from the green roofs into cisterns beneath the ground. The efficiency of the green roofs is directly related to the health of the plants. Traditionally, plant health is measured through stem counts, soil nutrient analysis, above ground biomass and root biomass. This project introduces multispectral cameras to the mix. These cameras, which can see beyond visible light, were used to produce images visualizing plant health on the roofs.

In fall 2023, the CARDNL team will complete the project by offering in-person and virtual outreach opportunities, where students, faculty and staff can learn more about the green roofs.



A sample of photos taken by the CARDNL team throughout the Islands in the Sky Project. Top left: Rams Head Plaza Green Roof. Top Right: Loudermilk Center for Educational Excellence. Bottom left: Koury Oral Health Sciences Building. Bottom right: Lower Genome Sciences Building.

Student Leadership

Ambitious, sustainability-minded undergraduate and graduate students take on organizational leadership roles across campus. Their dedication of time, energy, and problem-solving skills are instrumental in moving Carolina toward its greenhouse gas emissions, water sustainability and waste reduction goals.

CompostMates

[CompostMates](#) got its start through [Carolina Center for Public Service's Robert E. Bryan Fellowship](#) in 2020. The group partners with other student organizations such as Vegans for Peace, UNC Wesley and [APPLES Service Learning](#) to provide free food scrap pick-up to UNC-Chapel Hill students living off-campus.

It also promotes sustainable and environmentally conscious practices within the broader Chapel Hill community. CompostMates supports local organizations, like the Giving Garden and [Carolina Community Garden](#) through advocacy, publicity and food scrap donations. Compost donated to gardens is used to grow fresh produce for communities in need.



2022-2023 food waste diversion = **2,653.31 pounds**

All-time food waste diversion = **7073.49 pounds**

Epsilon Eta

[Epsilon Eta Environmental Honors Fraternity](#) connects students with the environment through academics, community building and service. During the 2022-2023 school year, Epsilon Eta recruited 95 students, hosted speakers and seminars, participated in community outreach and provided students with networking opportunities. Community service projects this year included trash cleanups, invasive species removal, campus gardening and compost cleanups.

Vegans for Peace

Based on nonviolence, love, mercy, equality and justice for living things, Vegans for Peace encourages veganism. At the University, the group participates in tabling events and partners with local community organizations, including Vegan Outreach, Dojo Fresh and Earth to Us. Vegans for Peace also spends time at animal sanctuaries twice a month.

Meantime Coffee Company

[Meantime Coffee](#) is a student-led nonprofit dedicated to professional development, community reinvestment and sustainability. The shop, located in the Campus Y, sources its coffee from Carrboro Coffee Roasters. This school year, Meantime formed a partnership with B3 Coffee to improve disability allyship within the café.

More than half of the money made at the shop goes to social justice initiatives. Meantime also emphasizes waste diversion; during the 2022-2023 school year, it diverted 4,512 pounds of waste from the landfill.

Meantime Gives Back



\$4,000 designated by baristas to charities.



Remaining 60% of profits to Campus Y social justice initiatives.

Bring Your Own Mug Incentive Program



Bring your own mug 9 times, get a free drink.



Meantime saw a 162% increase in reusable mugs.

UNC Student Government Dept. of Environmental Affairs

Collaborating with Chief Sustainability Officer Mike Piehler, Department of Environmental Affairs Co-Directors Ella Feathers and Jacob Crawford [hosted the University's first Energy Transition Town Hall](#). Held in January 2023, the event focused on the University's Climate Action Plan, renewable energy, the future of the cogeneration plant and more.

Carolina Outing Club

Founded in 2021, the [Carolina Outing Club](#) seeks to make the outdoors accessible, inclusive and equitable for UNC-Chapel Hill and the wider community. With 500 active members and 20 e-staffers, or troop leaders, the group went on several overnight trips during the 2022-2023 school year. Highlights include Jockey's Ridge in the North Carolina Outer Banks and Grayson Highlands State Park in Virginia.



UNC Student Government hosted the first Energy Transition Summit in January 2023.



Carolina Outing Club welcomes anyone who likes to get outdoors, no matter their skill level (photo by Carolina Outing Club).

Student Leadership Highlight: Renewable Energy Special Projects Committee

The Renewable Energy Special Projects Committee (RESPEC) is Carolina's student-run organization that manages the money collected through Carolina's Student Renewable Energy Fee. The table below describes the projects funded during the 2022-2023 school year.

Date	Project	Cost	Sustainability Benefit
Sept. 2022	Ultra-Low Temperature freezers for labs	\$103,536.34	Energy education, energy efficiency
Jan. 2023	ENEC 490 Supply Chain Class	\$8,000	Energy education
March 2023	Feasibility study: Memorial Hall solar panels	\$9,856	Renewable energy
April 2023	Efficient Freezer Rebate Program Renewable (through spring 2028)	\$350,000	Energy education, energy efficiency
April 2023	200 kW solar panel system on Rams Head Recreation Center	\$633,728	Renewable energy, energy education
April 2023	Green certification scholarships	\$6,991	Energy education
April 2023	3 EV Chargers in Morehead Lot	\$24,999	Renewable energy, energy education
April 2023	2 Haven Solar Picnic Tables	\$49,400	Renewable energy, energy education

Community Engagement

As part of the Town of Chapel Hill, the University strives to create a positive impact outside campus boundaries. We engage with Chapel Hill, Carrboro, and Orange County around sustainability issues to create a better society and a stronger future.

Orange County

Orange County is working to update its [solid waste master plan](#), titled *Road to Zero Waste*. The plan has a goal of [zero waste by 2045](#) and will identify a sustainable business model for managing waste. Orange County Solid Waste Management Department has engaged with community members, including students, through focus group sessions and advisory group meetings. The department has an app called Orange County NC Recycles, which reminds residents when to bring their recycling to the curb. The app also has a tool that shows residents whether certain items can be recycled.



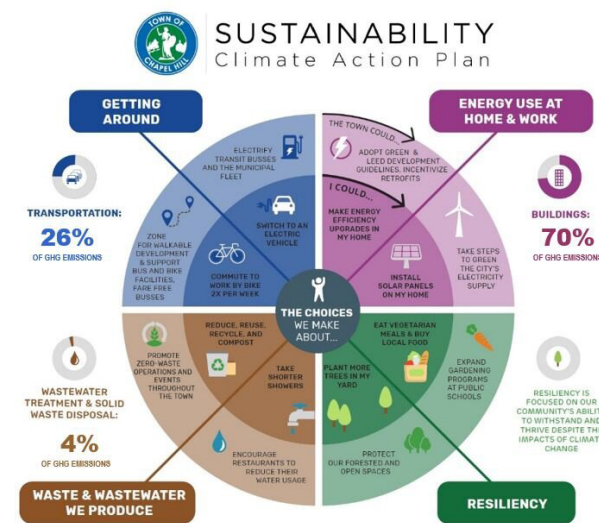
Students look into Meeting of the Waters Creek during a walk along the Campus to Garden trail to celebrate Creek Week.

Orange County [held its second annual Creek Week](#) in March 2023. The event celebrates the streams, lakes and rivers that connect our human and non-human communities. During the weeklong celebration, residents can participate in a litter cleanup challenge, paddling trips, art workshops, invasive plant removal, scavenger hunts and more.

Town of Chapel Hill

The University and the [Town of Chapel Hill](#) have a history of working together and drawing on each other's strengths to build a stronger community. Chapel Hill's sustainability team has expanded in recent years, from a team of one to a team of three. In spring 2021, the University and town demonstrated their joint commitment to climate action through the release of [complementary climate action plans](#). Chief Sustainability Officer Mike Piehler and Chapel Hill's Community Sustainability Manager John Richardson [talked about this partnership](#) on an episode of the Sustainable Carolina podcast.

In fall 2023, the Town of Chapel Hill launched its [Stream Team program](#), a volunteer water quality monitoring program. The Town will provide training, equipment and support to 10 teams. The teams will be assigned to monitor a stream in the area and record measurements at four times throughout the year.



The four main facets of Chapel Hill's Climate Action Plan include transportation, energy use, resiliency and waste/wastewater.

UNC Transportation and Parking

[UNC Transportation and Parking](#) hosts two big events every year: *Cyclicious* at the start of the school year and *May the Wheels be With You* at the end of the school year. At these events, those on campus can learn about the [Commuter Alternative Program](#) (CAP). The program provides incentives to students, staff and faculty who live off campus and use sustainable transportation to get on to campus. Participants in the program can ride the bus, join a rideshare or bike or walk to campus.



Every May, UNC Transportation and Parking hosts, "May the Wheels be with You," bringing together bike shops and community organizations in Polk Place.

This year, UNC Transportation and Parking made biking more accessible through the second iteration of the [Tar Heel Bikes program](#). The bikeshare program consists of 100 electric bikes, provided by Spin. Anyone on campus can download the Spin app to use a bike.

Center for Public Engagement with Science

At this year's Sustainability Research Symposium, Megan Lane gave an overview of the work that the [Center for Public Engagement with Science](#) (CPES) does. The team is currently helping with a NASA-funded project called [Lake Observations by Citizen Scientists and Satellites](#). The project connects research from the UNC Department of Earth, Marine and Environmental Sciences with CPES and seeks to understand how the volume of water changes in lakes over time. Citizens who walk or paddle past lake gauges that are part of the project are invited to text measurement data to the project.

The Center is also involved with the [UNC Superfund Research Program](#), housed in UNC Gillings School of Global Public Health. Funded by the National Institute of Environmental Health Sciences, UNC-Chapel Hill's project aims to better understand the impact and risks of arsenic exposure on people.

Morehead Planetarium and Science Center

[Morehead Planetarium](#) hosts the UNC Science Expo every April. The event is part of the North Carolina Science Festival. In 2023, approximately 60 exhibitors from UNC-Chapel Hill and the wider community participated in the event. For the 2024 event, Sustainable Carolina is working with Morehead Planetarium to make the event more sustainable.

North Carolina Botanical Garden

The [North Carolina Botanical Garden](#) (NCBG) manages 1,200 acres of gardens and natural areas around campus. The garden's Allen Education Center is a [LEED Gold certified building](#); all systems and materials were designed to minimize environmental impact. Twice a year, NCBG publishes its [Conservation Gardener Magazine](#), which talks about conservation in the gardens and ways people can incorporate native plants into their own gardens at home. The public can purchase native plants at the NCBG fall and spring native plant sales.

Carolina Tree Heritage

The [Carolina Tree Heritage program](#) gives second life to downed campus trees by transforming trunks and branches into furniture, sculptures and other creations. In 2021, the team installed a 5-foot wide, 400-pound table in the South Building's rotunda. The table is made from a 251-year-old post oak tree that stood behind Old West on the edge of McCorkle Place until 2018.

Communications

Advancing Carolina’s sustainability goals requires regular communication through different mediums. We not only communicate about our own initiatives but also those taking place within other departments and across campus.

Monthly Newsletter: Our newsletter is published on the last Tuesday of every month. It features updates, news, events and professional development opportunities at Sustainable Carolina and across campus. [Subscribe to our newsletter.](#)

Many of our campus partners have their own newsletters:

- [Environment, Ecology and Energy Program Newsletter](#) (E3P)
- [NC Water News Newsletter](#) (UNC Water Institute)
- [Office of Sponsored Programs Newsletter](#) (UNC Research)
- [UNC Institute for the Environment Newsletter](#) (UNC Institute for the Environment)

Sustainable Carolina News: On the news section of our website, we publish campus happenings, alumni stories and deep dives into our emissions data. [Visit our blog.](#)

Social Media: Visit us on [Twitter](#) and [Instagram](#).

Monthly Podcast: The Sustainable Carolina Podcast features staff and faculty from across the University and their work related to sustainability. [Subscribe to our podcast.](#)



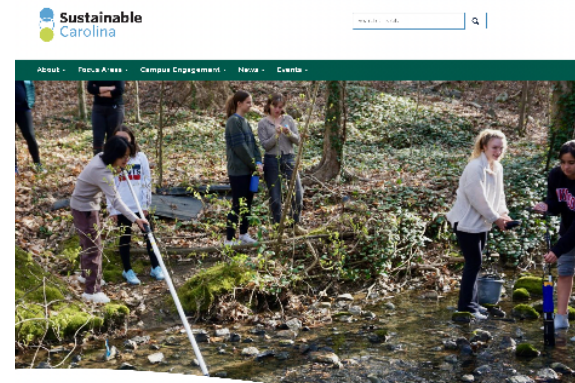
**SUSTAINABLE
CAROLINA**
the podcast

Sustainable Carolina Podcast | Season 2

Release Date	Guest(s)	Title
Sept. 2022	Mike Piehler	Pursuing Sustainability Goals as a Collective
Oct. 2022	UNC Eco-Concern Study Team	Understanding Climate Change Concerns & Eating Behaviors
Nov. 2022	David Gorelick	Finding Your Research Interests
Dec. 2022	Carolina Drone Lab	Flying for Field Work
Jan. 2023	Melanie Elliott	Powering Carolina's Energy Transition
Feb. 2023	Alex Hopkins	Engaging Through the Energy Transition Initiative
April 2023	John Richardson	Building Town-Gown Partnerships
May 2023	Greg Characklis, Hope Thomson, Delia Wegner	Infrastructure, Sustainability and Affordability
June 2023	Xuwei Wang, Noah Kittner	Urban Heat Island Effect & Climate Resilience
July 2023	Megan Lane, Sarav Arunachalam	Protecting Water Quality, Improving Air Quality
Aug. 2023	Amanda DelVecchia, Drew Coleman	Surface Waters and Underground Elements

Website Update

Working with [ITS Digital Services](#), [Digital Accessibility Office](#) and [UNC Creative](#), UNC Institute for the Environment and Sustainable Carolina unveiled new websites in fall 2023. Because Sustainable Carolina is housed within the Institute, it was important for the websites to have a similar look and feel. Our teams kept digital accessibility at the forefront of the redesign, to ensure those using screen readers, screen magnification software and/or other tools can navigate our



Sustainable Carolina Homepage

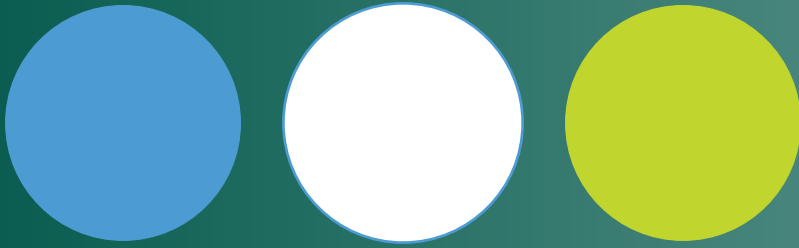


UNC Institute for the Environment Homepage

Website Navigation

The table below details the menu and sub-menu items found on Sustainable Carolina’s updated website.

Menu Item	Sub-menu item	Description
About	About	History of Sustainable Carolina at the University; progress, goals and how success is measured/tracked.
	Team	Photos and bios of professional staff and Sustainability Council members.
	Strategic Framework	Sustainable Carolina’s mission, vision and goals/strategies.
	Resources	Links to our reports, plans, greenhouse gas data, along with a list of ways individuals can be sustainable on campus.
Focus Areas	Climate Action	Climate dashboard; Climate Action Plan, history and stories.
	Water	Water dashboard, Water Plan, history and stories.
	Waste	Waste dashboard; waste history and stories.
	Research & Academics	Sustainable Triangle Field Site information; campus-wide sustainability internship opportunities; sustainability course list.
Campus Engagement	Sustainability Coalition	Description of coalition and list of student organizations invited to be part of the coalition.
	University Operations	Building design; green roofs; energy efficiency; Champion Sustainability Fund projects.
	Internship Programs	Sustainable Tar Heels internship program; Hanesbrands internship partnership.
	Green Programs	Green Office and Green Labs programs.
News	News	Blog featuring press releases, news stories and student work.
	Newsletter	Sign-up and archive for monthly newsletter.
	Podcast	Lists all episodes with descriptions.
	Press	Resources for those looking to write about Sustainable Carolina or sustainability at the University.
Events	Calendar	High level view of sustainability events happening at Carolina.
	Annual Events	Describes fall and spring events put on by Sustainable Carolina and/or our partners.
	Special Events	Describes special events related to sustainability happening at Carolina.



THE UNIVERSITY
of NORTH CAROLINA
at CHAPEL HILL



INSTITUTE FOR
THE ENVIRONMENT



Sustainable
Carolina