A recently published Tufts-led study found a direct connection between the stay-at-home orders following the COVID-19 outbreak this spring with improved air quality in Somerville, Massachusetts neighborhoods located next to Interstate 93 and busy side roads.

The authors—CEE faculty members Research Assistant Professor Neelakshi Hudda and Professor John Durant with alumni Matt Simon, EG17, and Allison Patton, EG14—correlated dramatic drops in traffic along stretches of Interstate 93 and neighboring Routes 28 and 38 with cleaner air in areas where car and truck exhaust are the dominant sources of air pollution. The study was supported by the City of Somerville and published in a special issue of Science of the Total Environment.

"The pandemic shutdown was a great opportunity to gather data and tell people exactly how much better or worse [...] all that driving is making our lives," said Research Assistant Professor Neelakshi Hudda, pictured in the Tufts Air Pollution Monitoring Lab. "I am hopeful we can capitalize on it going forward."

The team found that a 71% drop in cars and 46% drop in trucks on the road led to a more than 50% reduction in traffic-related air pollution.

Tufts researchers found a significant drop in traffic-related air pollution in the Boston area during Massachusetts’ stay-at-home orders, which offers lessons for the future.

Continued on page 3
Dear CEE alumni and friends,

Although the 2020 fall semester brings unprecedented change to our campus, it also brings the routines of academic life. In September, we welcomed undergraduate and graduate students back to campus with a mix of hybrid and remote learning. From my own teaching, I am energized by the student interactions in my in-person lecture and impressed with the collaborative technology tools we have all learned to use in my virtual computer lab.

The Department of Civil and Environmental Engineering, the School of Engineering, and Tufts University have reaffirmed our commitments to making Tufts an anti-racist institution at every level—and to meaningful actions that will eradicate structural racism. Our student chapter of the American Society of Civil Engineers (ASCE) hosted a town hall discussion on diversity, equity, and inclusion in civil and environmental engineering. That event led to follow-up conversations and actions throughout the School of Engineering and within our department, which continue in a coordinated discussion on integrating social justice and equity across the curriculum. We will highlight existing curricular efforts and expand efforts across the CEE curriculum. Learn more about students’ advocacy and the department’s efforts on page 5.

While laboratory research slowed during the spring curtailment of campus activities, research and innovation continued. The end of the fiscal year showed CEE with a 25% increase in research expenditures. Professors Durant and Hudda collected air quality data in Boston and surrounding communities when traffic decreased. At the same time, Professors Pickering and Lantagne have used their expertise on environmental health impacts and surface transmission to provide insight on community transmission of the virus that causes COVID-19.

The department continues to make strides in the areas of offshore wind energy and data science for complex systems. Professors Moaveni, Hines, and Kuchma launched new projects related to offshore wind infrastructure, including a new PhD program and a new postbaccalaureate offering in offshore wind energy engineering. Professors Islam and Lamontagne, in partnership with other Tufts faculty, were recently awarded a new NSF award on data-driven decision making. Also this year, we welcomed Assistant Professor Deborah Sunter to the department, with research focusing on the use of computational modeling to improve environmental sustainability.

As we continue to build connection across our Tufts CEE community, please join us for our Friday seminars (go.tufts.edu/CEEseminars). We will hold our winter Alumni/Student Networking Event virtually—so stay posted. Our CEE community continues to anticipate and respond to the emerging challenges of our changing world at the intersection of infrastructure, the environment, and people. Read on, and visit our website at engineering.tufts.edu/cee, to learn more about the recent activities and accomplishments of our community.

Sincerely,

Laurie Gaskins Baise
Professor and Chair

FROM THE CHAIR

QUICK HITS

Professor Steven Chapra, Louis Berger Chair in Civil and Environmental Engineering, received the department’s Distinguished Service Award in recognition of his accomplishments as a leader in civil and environmental engineering education and practice.

Professors John Durant and Babak Moaveni were promoted from associate professor to full professor. Laura Sacco received a promotion to senior department administrator after 13 years of dedicated service to the department.

Associate Professor Chris Swan received the Tufts ASCE/CEE Faculty Member of the Year Award, which is given annually by CEE students.

Professor Emeritus Richard Vogel was honored by the ASCE as a Distinguished Member, in recognition of a lifetime of fundamental contributions to stochastic hydrology and its novel applications. He also received the 2020 Ven Te Chow Award from the ASCE Environmental and Water Resources Institute.
Beginning on March 24, when Governor Charlie Baker ordered non-essential offices and businesses to close, and continuing through May 14, the Tufts team drove the Tufts Air Pollution Monitoring Lab, an electric car outfitted with rapid-response instruments, and monitored air quality along an almost ten-mile route. The team went out on 15 days for three-to-four hours per day during the economic shutdown period to measure air quality over a range of meteorological conditions.

On urban roadways in Somerville, the Tufts team found that both median ultrafine particle number concentration (PNC) and black carbon (BC) concentrations during the lockdown period were “substantially lower than pre-pandemic levels: 60 to 68 percent lower for PNC and 22 to 46 percent lower for BC, depending on the road class.” The team calculated that the mandated shutdowns and stay-at-home advisories reduced daily car traffic by 71 percent and truck traffic by 46 percent.

When the pandemic lockdown happened, Durant and Hudda immediately recognized it as an unprecedented opportunity to enrich their research on how traffic patterns are tied to clean air. “It called out to us as a natural experiment,” said Durant. “Now we have a really interesting story to tell, and we believe it has enormous relevance to the decisions we make now—and long after the pandemic is over.”

“If we can speak to it, and point to this collective lived experience of cleaner air that we now share, then maybe we can bring in minor changes in people's lifestyles or mindsets,” Hudda said. “We have before us a great opportunity to make people realize that sustainability is about living with less.”

Adapted from “Yes, the Air Was Better During Lockdown” by Laura Ferguson, Tufts Now. Read more at go.tufts.edu/airquality.

NEW FACES

Masoud Arshadi
Research Assistant Professor Masoud Arshadi earned his BS in civil engineering from Sharif University of Technology and his PhD from University of Colorado Boulder. His research focuses broadly on mathematical modeling of environmental fate and transport of contaminants in porous and fractured media, with emphasis on contaminant source zone characterization and in-situ chemical and bio remediation.

Maya Nadimpalli
Research Assistant Professor Maya Nadimpalli earned MS and PhD degrees in environmental sciences and engineering from University of North Carolina at Chapel Hill. After completing her doctoral studies, she served as a Gillings Global Public Health Fellow within the Department of Infection and Epidemiology at the Institut Pasteur in Paris, France. She first joined Tufts in 2018 as a civil and environmental engineering research fellow.

Mingming Song
Research Assistant Professor Mingming Song earned his BS from Zhejiang University, MS from Tongji University, and PhD in civil and environmental engineering from Tufts University. After receiving his doctoral degree, he became a postdoctoral scholar at Tufts. His research interests include structural health monitoring, structural risk and reliability, uncertainty quantification, system identification, Bayesian inference, and machine learning.

Deborah Sunter
After receiving her doctorate from University of California-Berkeley, Assistant Professor Deborah Sunter advanced her understanding of energy policy as an AAAS Science and Technology Policy Fellow at the U.S. Department of Energy. She joins CEE from the Tufts Department of Mechanical Engineering. She uses computational modeling and data science techniques to explore the interface of technology innovation and policy for improved environmental sustainability.
A team of Tufts researchers, including co-PIs Professor Shafiqul Islam and Assistant Professor Jonathan Lamontagne, received a $3 million National Science Foundation NRT-HDR grant to instruct graduate students in using data-driven decision making to address complex resource problems like those that sit at the intersection of food, energy, water, and ecosystems. The initiative kicks off in the fall of 2020 and aims to train both policy-savvy data experts from STEM disciplines and data-proficient decision makers from other disciplines.

Through research in the lab and field, Associate Professor Daniele Lantagne and her team give common intervention practices, like bucket chlorination, a greater chance of intercepting the deadly cholera bacteria. Based on the lab’s data-supported recommendations, endorsed by both the World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC), public health responders in countries impacted by cholera and Ebola now effectively wash their hands with a chlorine solution.

A collaboration between co-PIs Professor Laurie Baise, Professor Babak Moaveni, and Research Associate Professor Magaly Koch of Boston University was recently funded by the National Geospatial Intelligence Agency to build a benchmark imagery dataset for automated classification of damage due to natural disasters. The project capitalizes on the team’s experience in damage detection in both the built and natural environment and their experience in machine learning applications to classification of imagery.

Professor Steven Chapra, Louis Berger Chair in Civil and Environmental Engineering, retired this year after more than 20 years teaching at Tufts. He first joined the Department of Civil and Environmental Engineering in 1999, coming to Tufts from teaching appointments at the University of Colorado at Boulder and Texas A&M University.

A Fellow of both the American Society of Civil Engineers (ASCE) and the Association of Environmental Engineering and Science Professors (AEESP), Chapra’s research interests include water quality modeling and advanced computer applications in environmental engineering. He is a two-time recipient of the ASCE Environmental and Water Resources Institute’s Wesley W. Horner Award, which recognizes the authors of the paper that made the most valuable contribution to the environmental engineering profession in a given year.

The Department extends gratitude to Professor Chapra for his professionalism, knowledge, enthusiasm for the subject, and collegiality over the past two decades. Congratulations, Professor Emeritus Chapra!

FACULTY SPOTLIGHT: STEVEN CHAPRA

Professor Chapra changed the course of countless students’ lives over 21 years in the Department of Civil and Environmental Engineering at Tufts.

RESEARCH HIGHLIGHTS
This summer and fall, the Tufts student chapter of the American Society of Civil Engineers (ASCE) worked closely with CEE faculty and staff to host department community events on diversity, equity, and inclusion in civil and environmental engineering. The Tufts ASCE Chapter Executive Board’s Equity Team offered a student perspective on school- and university-wide initiatives amid the national wave of anti-racist protests and activism.

The ASCE Equity Team hosted a summer webinar discussing the Black Lives Matter movement and equity in the fields of civil and environmental engineering. With insights drawn from that community conversation, which was attended by many CEE students and faculty members, the Equity Team proposed a series of action steps. The faculty are now meeting on those items, including careful consideration of the CEE curriculum, ABET accreditation criteria, individual class content, and representation among guest speakers.

Moving forward, the ASCE Equity Team will continue coordinating with the department on CEE’s commitment to providing a safe and welcoming environment to all students and being an anti-racist institution. The Tufts ASCE Chapter plans to hold discussions, meetings, town halls, and panels where the community can collectively learn and plan how to advance equity in the fields of civil and environmental engineering and at Tufts.

Learn more about upcoming events at instagram.com/tuftsasce.

STUDENT SPOTLIGHT: ASCE STUDENT CHAPTER

STUDENT HIGHLIGHTS

April Weintraub, E20, won a Tufts Presidential Award for her work advocating for those in need, both at Tufts and in the university’s communities.

PhD candidate Ifeanyi Mbah traveled to the 2019 UN Climate Change Conference as a member of the delegation from Tufts Institute of the Environment.

Kim Dao, E21, received a YPT Boston 2020 Scholarship from the local chapter of the global organization Young Professionals in Transportation (YPT).

PhD student Jason Hnatko won a third-place prize in the 2020 Geosyntec Groundwater Student Paper Competition.

Magnifique Mukundwa, E20, received a Tufts Senior Award in recognition of her academic achievement, participation in campus and community activities, and leadership.
CONGRATULATIONS TO THE 2019–2020

Undergraduate Awards
Michael E. Avtges Award (SAME): Pietro Picco
William P. Morse Scholarship (ASCE): Michelle Meyer, Sarah Morton
Max O. Urbahn Award (SAME): Michelle Meyer
Howe-Walker Award (ASCE): Sebastian Sak

Cataldo Awards
Plearn Aroonchote, Elana Chan, Kim Dao, Mateo Gomez, Bridget Moynihan, Ida Weiss

Undergraduate Littleton Awards
Sophie Buckingham, Katherine Lambert, Michelle Meyer, Sarah Morton, Magnifique Mukundwa, Sean Murphy, Pietro Picco

Undergraduate Littleton Fellowships for continued graduate study at Tufts
Annika Han, Sebastian Sak, April Weintraub

Bachelor of Science in Civil Engineering
Fernanda Brena Sarah Morton
Annika Han Sean Murphy
Salomon Herrera-Montesdeoca Pietro Picco
Dillon Knight Justin Reyes
Katherine Lambert Reina Romero
Kathryn Luhrman Sebastian Sak
Michelle Meyer David Shepard

Bachelor of Science in Environmental Engineering
Sophie Buckingham Stephanie Pon
Julian Finney Casey Zorn
Camden Myles

Bachelor of Science in Engineering
Magnifique Mukundwa
Samantha Rubin

Graduate Awards
Linda M. Abriola Graduate Fellowship: Christina Sanon
William Edgerton Fellowship: Alex Chansky
N. Bruce and Lorry Hanes Endowed Fellowship: Molly Cantrell
Provost Fellowship: Marine Ricau
Kentaro Tsutsumi Fellowship: Lauren Quicke
School of Engineering Dean’s Fellowship: Burak Bagirgan, Abigail Birnbaum, Catherine Knox

Graduate Littleton Awards
Jason Hnatko, Fatemeh Kazemiparkouhi, Deniz Ranjipour, Sofia Puerto Tchemodanova

Master of Science in Civil and Environmental Engineering
Caitline Barber Martha Ondras
Ryan Baronowski Marshall Pontrelli
Jennifer Chittick Tianyi Shang
Veronica Gonzales Zachary Tanguay
Tian Jin Alexander von Campe
Andrew Mao

PhD in Civil and Environmental Engineering
Cameron Bradley
Dissertation: Design Philosophy and Parametric Collapse Performance of Low-Ductility Concentrically Braced Frames with Reserve Capacity
Advisor: Eric Hines

Tiffany Duhl
Dissertation: Microbially-Mediated Transformations of Chlorinated Solvents and Engineered Nanomaterials in the Subsurface: Implications for Bioremediation, Natural Attenuation, Fate and Transport
Advisor: Natalie Cápiro

Jason Hnatko
Dissertation: Assessment of Dehalococccoides McCartyi Strain Specific Responses to Soil Heterogeneity, Pulsed Electron Donor Delivery, and Perfluoroalkyl Substances
Advisor: Natalie Cápiro
ALUMNI HIGHLIGHTS

Now an assistant professor at Tufts School of Medicine, Laura Corlin, A13, EG15, EG18, is studying the role that local air conditions could play in the spread and severity of the SARS-CoV-2 virus that causes COVID-19. Her current research focuses on measuring and understanding the health consequences of air pollution, particularly how ultrafine particles in polluted air affect people with chronic health conditions—especially relevant in recent years as wildfires of unprecedented size continue to rage across the globe.

Merrimack College Associate Professor James Kaklamanos, E08, EG10, EG12, was recognized as an ASCE Geo-Institute New Face of Geoengineering.

Sohom Ray, E12, helps run Gorongosa Coffee, a business that directly benefits the people and wildlife of Gorongosa National Park in Mozambique. As chief operating officer, Wilburn oversees the company’s international roasting, distribution, and marketing.

Eric Wilburn, E12, rallied volunteer drivers in the San Francisco Bay Area to deliver donated personal protective equipment (PPE). Working with a regional affiliate of grassroots organization GetUsPPE, Tanimoto and fellow volunteers collectively distributed more than 81,000 face shields, 292,000 gloves, 7,400 N95 masks, and 75,000 surgical masks to more than 220 locations by June.

Marlene Wolfe, EG19, shared her expertise in the effectiveness of handwashing practices with the Tufts community. In the context of the COVID-19 pandemic, she compared the effectiveness of handwashing with soap and water to that of washing with alcohol-based hand sanitizer, and encouraged Tufts Now readers to follow recommendations and instructions from the CDC and local and national public health authorities.

CEE is collecting information on experiential opportunities for students. If you have any job or internship openings, please contact us at ceeopportunities@tufts.edu.

GRADUATES AND AWARDEES

Caitlin Johnson
Dissertation: Measuring Mixtures of Environmental Pollutants in Human Plasma Samples from Three Study Populations
Advisor: Kurt Pennell

Fatemeh Kazemiparkouhi
Dissertation: Impact of Long-term Ozone and Fine Particle Component Exposures on Cause-Specific Mortality in the U.S.
Advisor: Helen Suh

Laura Corlin
Dissertation: A Forecasting Framework for Complex Systems: Reframing of Flood Forecasting from Local to Global Scales with Requisite Simplicity
Advisor: Shafiqul Islam

Deniz Ranjpour
Dissertation: Stiffness and Anisotropy Characterization of Mechanically Compressed Cohesive Soils Using Directional Wave Propagation
Advisor: John Germaine

Mingming Song
Dissertation: Uncertainty Quantification and Propagation in Linear and Nonlinear Dynamic Structural Systems
Advisor: Babak Moaveni

Katherine Woodward
Dissertation: Removal of Antibiotic Residues and Control of Antibiotics Movement from Cattle Industry Wastewater in Nebraska
Advisor: David Gute

Sohom Ray
Advisor: Daniele Lantagne

Eric Wilburn
Dissertation: Earthquake Nucleation with Heterogeneous Physical Properties
Advisor: Robert Viesca

Abu Hena Mustafa Kamal Sikder
Advisor: Daniele Lantagne

Lurong Yang
Dissertation: Influence of Coupled Processes on Microbial Reductive Dechlorination in Heterogeneous Porous Media
Advisor: Linda Abriola

Jim, E83 and A83, and Kristy Tiampo, E83, received the CEE Outstanding Achievement Award in recognition of their outstanding achievements and leadership in their careers.
Reductions in pollution during lockdown

A team of faculty, alumni, and students from the Department of Civil and Environmental Engineering recognized the pandemic lockdown as an unprecedented opportunity to enrich their research on how traffic patterns are tied to clean air. Students like Ida Weiss (pictured, below) captured mobile data in the Air Pollution Monitoring Lab. “It called out to us as a natural experiment,” said Professor John Durant (pictured, right). “Now we have a really interesting story to tell, and we believe it has enormous relevance to the decisions we make now—and long after the pandemic is over.”