

Safeguarding *the Future*

A School of Engineering initiative is tackling the challenges threatening urban resiliency and sustainability. ■ *By* AMY WAGNER

The air quality in New Jersey, according to a 2020 American Lung Association report, is among the worst in the nation. Flint, Michigan's lead-contaminated water crisis exposed the inherent vulnerability of urban water systems. New Jersey coastlines are regularly ravaged by hurricanes and tropical storms, while climate change accelerates at a once unimaginable pace.



At Rutgers, cross-university collaborations are tackling problems like these that threaten the sustainability and resilience of urban environments academically and through cutting-edge research.

A case in point: a new undergraduate environmental engineering (EnvE) program that is jointly — and uniquely — administered by Rutgers School of Engineering (SoE) and School of Environmental and Biological Sciences (SEBS).

“This novel program has a long history but has now culminated in this unique cross-unit collaboration in a critical field,” says Donna Fennell, an environmental engineering professor in the SEBS Department of Environmental Sciences.

Taking that collaboration another step forward, a university-funded strategic diversity cluster hiring initiative — a part of Rutgers’ presidential faculty diversity initiative — has launched to strengthen the impact of the EnvE program and advance urgently needed research solutions to safeguard the long-term health and



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NENAD GUCUNSKI



safety of New Jersey residents and beyond the state. The program also seeks to fill the pipeline with engineers trained for critical environmental engineering research.

The Frontline of Environmental Sustainability and Resilience

According to Fennell — who investigates microbial processes found in natural and engineered systems and applies them to remediation of contaminated sites — innovative approaches and technologies that successfully address urban environmental challenges exacerbated by climate change in New Jersey will also have important worldwide implications.

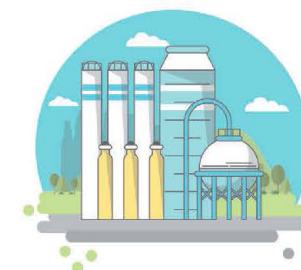
Civil and environmental engineering (CEE) associate professor Jie Gong explains, “New Jersey’s sprawling coastlines and concentration of wealth and economic activities along these coastlines make the state a fertile proving ground for this line of research.”

CEE professor and chair Nenad Gucunski describes the initiative as one of “major strategic importance since it will build the department’s research capacity through both a faculty hiring cluster and collaboration across multiple units in the university. This will fuel the development of sound engineering, health equity, and environmental justice solutions critical to the education of future environmental engineers.”

ENVIRONMENTAL FOCUS

Above, SEBS professor Donna Fennell, researches bioremediation and microbial activity; far left, SoE’s Urban and Coastal Water System Laboratory; near left, environmental justice protest in Newark, New Jersey, 2021.

Broadening the Dialogue



The School of Engineering is engaging beyond the university to raise awareness about policy and research on climate change and its effects on urban environments and hydrogen energy technologies. ■ In May, a symposium brought industry, academic, government, and environmental justice leaders together to address environmental pollution and aging infrastructure for healthier and more resilient communities. “Urban environments are home to billions of people around the world. We need broad engagement and effort to address pressing environmental challenges,” said Nenad Gucunski, CEE professor and chair. ■ A symposium in September brought together experts for a forum on hydrogen energy technologies and policy. “These are exciting times for hydrogen,” said Mohsen Jafari, ISE professor and chair, noting an infusion of federal money and the creation of regional clean hydrogen hubs designed to produce, process, deliver and store hydrogen.

ILLUSTRATION: ISTOCK IMAGES

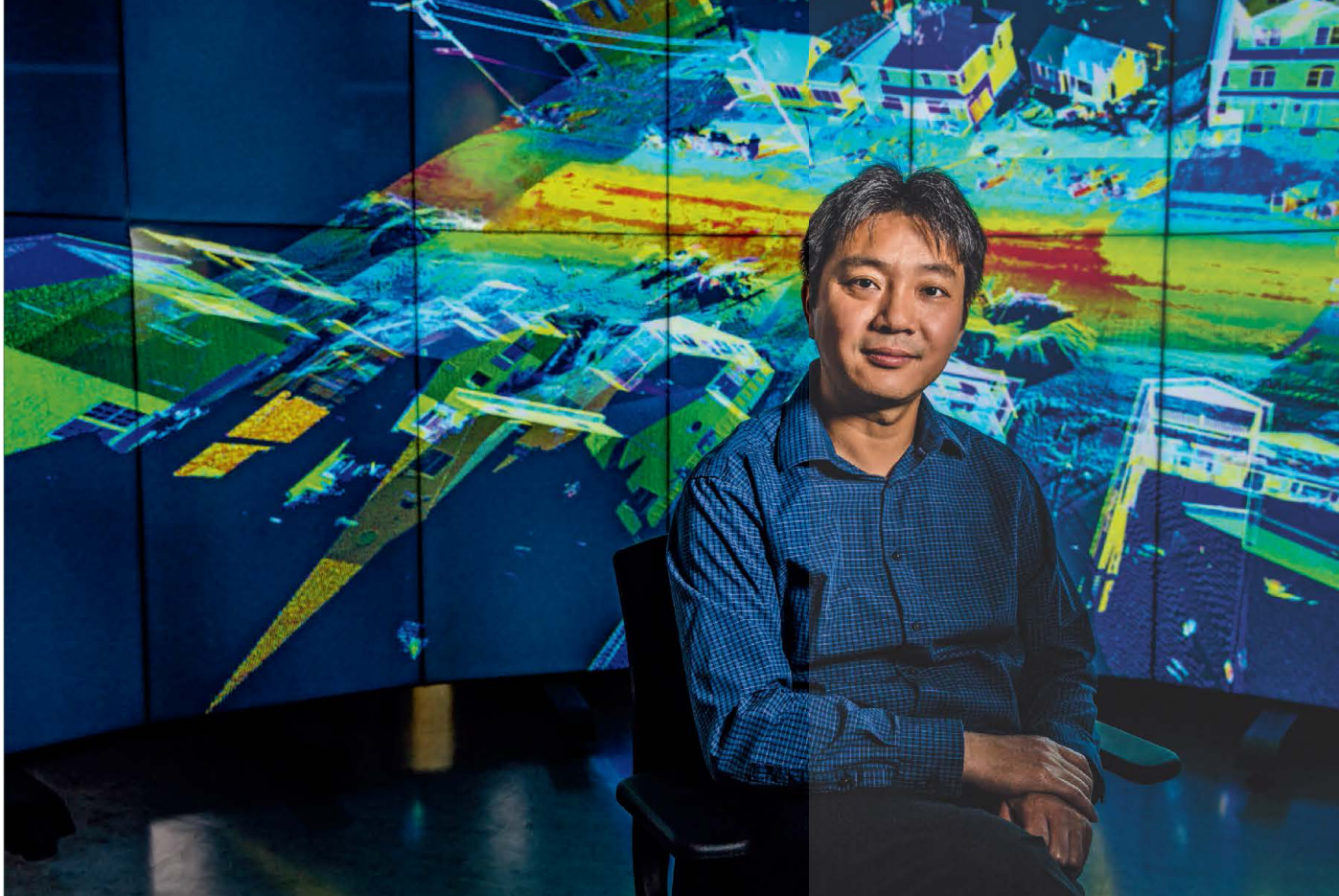
The cluster will establish Rutgers as a global leader in developing environmental engineering solutions not only for New Jersey — the nation’s most densely populated state — but also for the world’s most densely populated regions.

Faculty joining SoE will look to develop innovative technologies for sustainable, resilient cities and for remediating urban environments challenged by poor air, soil, or water quality, as well as devise fresh uses for urban wastewater. SEBS hires will hone in on sustainable environmental systems able to support ecosystems and people facing climate change, as well as deploy cutting-edge technologies to analyze and manage environmental systems. Other academic partners will provide expertise in urban and environmental health, computational environmental bioinformatics, and the environmental justice and social impacts of climate change.

A Dynamic Team

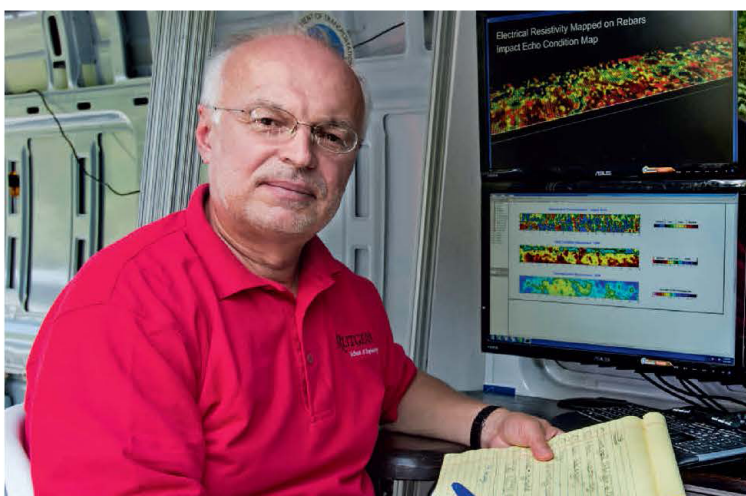
“I’m excited about having young faculty join us and bring their energy, excitement, new ideas, and novel approaches to our efforts,” says Fennell. “I look forward to seeing their growth as scholars and their engagement with our outstanding students.”

Gong is equally eager to “help build a team and interact with others to address some of the most urgent issues facing humankind.” **SOE**



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JIE GONG



STORM SURGE

CEE associate professor Jie Gong uses geospatial big data and large-scale visualization to support disaster response, right; Nenad Gucunski, CEE professor and chair, conducts research in geotechnical engineering, below; aerial view of devastated Seaside Heights Casino Pier where the roller coaster, Star Jet, was swept into the ocean by Hurricane Sandy in 2012, below right.

“The initiative is a catalyst to build a critical mass within CEE in the area of urban environments. And it will definitely improve the visibility and diversity of the department,” says Gong, who is improving flood prediction models by using drones, van-based LIDAR systems, and geospatial data analytics to assess the coastal damage caused by devastating storms, and even more importantly to better prepare for coastal events.

A Cross-University Initiative

According to Gucunski, the complexity of the initiative’s urban environments theme demands the engagement of faculty and students from across the university. These include not only the CEE and SEBS Department of Environmental Sciences, but also the Edward J. Bloustein School of Planning and Public Policy and the Rutgers University School of Social Work.

To meet these programs’ needs — and augment the solutions-driven EnvE curriculum with a more holistic understanding of pressing environmental issues — a cluster of six diverse assistant professors and two presidential postdoctoral fellows will be hired over the next three years.