

A photograph of a moss-covered rock in the foreground, with a waterfall cascading down a dark, rocky surface in the background. The scene is dimly lit, creating a moody atmosphere. The text is overlaid on the left side of the image.

PEOPLE

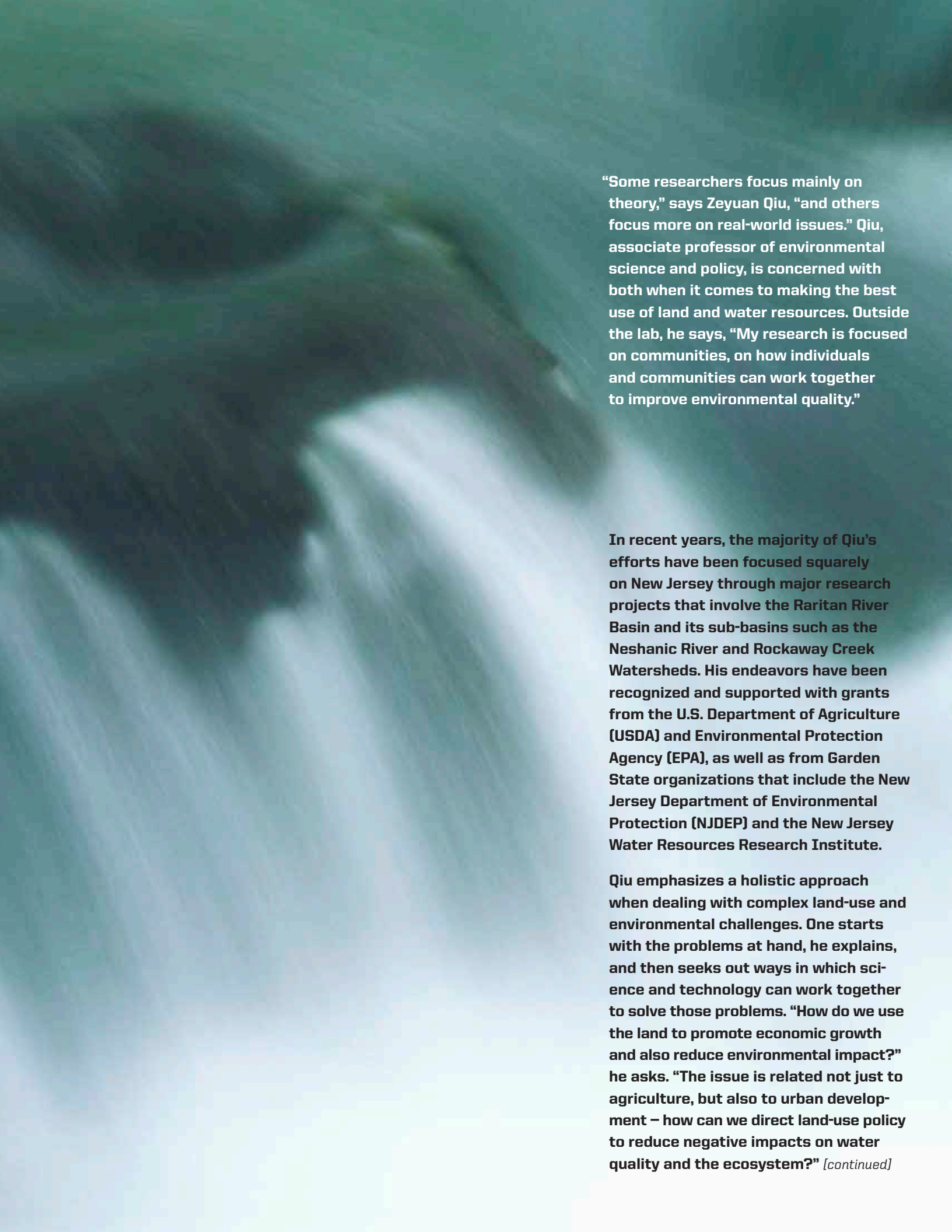
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LAND

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WATER

BALANCING CHALLENGES  
FROM CHINA TO  
THE GARDEN STATE



**“Some researchers focus mainly on theory,” says Zeyuan Qiu, “and others focus more on real-world issues.” Qiu, associate professor of environmental science and policy, is concerned with both when it comes to making the best use of land and water resources. Outside the lab, he says, “My research is focused on communities, on how individuals and communities can work together to improve environmental quality.”**

**In recent years, the majority of Qiu’s efforts have been focused squarely on New Jersey through major research projects that involve the Raritan River Basin and its sub-basins such as the Neshanic River and Rockaway Creek Watersheds. His endeavors have been recognized and supported with grants from the U.S. Department of Agriculture (USDA) and Environmental Protection Agency (EPA), as well as from Garden State organizations that include the New Jersey Department of Environmental Protection (NJDEP) and the New Jersey Water Resources Research Institute.**

**Qiu emphasizes a holistic approach when dealing with complex land-use and environmental challenges. One starts with the problems at hand, he explains, and then seeks out ways in which science and technology can work together to solve those problems. “How do we use the land to promote economic growth and also reduce environmental impact?” he asks. “The issue is related not just to agriculture, but also to urban development – how can we direct land-use policy to reduce negative impacts on water quality and the ecosystem?” *[continued]***





Associate Professor Zeyuan Qiu

“IT’S IMPORTANT TO UNDERSTAND HOW VARIOUS TYPES OF LAND USE IN DIFFERENT PARTS OF A LANDSCAPE REQUIRE DIFFERENT MANAGEMENT PRACTICES.”

### STUDYING CRITICAL NEEDS

Qiu’s focus on the interplay between people and the land they live on has so far spanned two countries, 25 years, and sixteen federal and state grants with a total budget of around \$3 million. He earned a bachelor

of science in land-use planning in 1986 from Huazhong Agricultural University, also known as Central China Agricultural University, where he studied how to best use land to support human needs. He continued to explore the subject at the People’s University of China, now called Renmin University, from which he received his master’s in land management.

In 1993, Qiu came to the United States to pursue a doctorate in agricultural economics at the University of Missouri-Columbia. His dissertation assessed the tradeoff between agricultural profitability and water pollution and discussed how policy instruments can be used to motivate farmers to change land-use practices to reduce agricultural nonpoint source (NPS) pollution.

### A LEADING ROLE

After completing his PhD in 1996, Qiu stayed on at the University of Missouri for an additional five years to research land use and water-resource management before coming to NJIT. While on sabbatical leave for the 2010-2011 academic year, he represented NJIT as lead or co-lead for several major studies centered on water resources and ecosystem management.

The Neshanic River Watershed Restoration Plan project has been funded by a grant awarded under the U.S. Clean Water Act (CWA) through the NJDEP Office of Policy Implementation and Watershed Restoration. The project has sought to bring water quality in the Neshanic River Watershed into compliance with standards established by the NJDEP following CWA requirements.

A STAR (Science To Achieve Results) grant funded by the EPA centered on several municipalities, including Clinton, Readington and Tewksbury Townships in the Rockaway Creek Watershed, also part of the Raritan

River Basin. It focused on protecting Critical Source Areas, smaller but important portions of the landscape. The goal is to improve water quality through

cooperation with municipalities and an understanding of how those municipalities use – and can better protect – their natural resources. The EPA STAR program engages the nation’s best scientists and engineers in targeted research that complements the agency’s own environmental science and engineering initiatives and those of partners in other federal agencies.

Another project funded by a USDA grant concentrated on restoring riparian functions by converting agricultural lands back into vegetative buffers in the Raritan River Basin. Riparian zones – essentially, riverbanks and the plant and animal life they support – are vital to the ecological health of rivers and streams in an area. A healthy riparian zone will protect rivers and streams from NPS pollution such as runoff from fields treated with insecticides or fertilizer, toxic chemicals and industrial waste from building sites, and even urban waste like grease and oil.

“It’s important to understand how various types of land use in different parts of a landscape require different management practices,” explains Qiu. “With the technology available today to advance the basic science, we can pinpoint which parts of the landscape cause the most damage to streams and ecosystems. Very often, we should protect such critical parts by keeping them in a natural condition. But if land is already developed or used for agriculture, management practices are needed that will complement these uses and achieve the best environmental effects.”

### COMMUNITY INVOLVEMENT

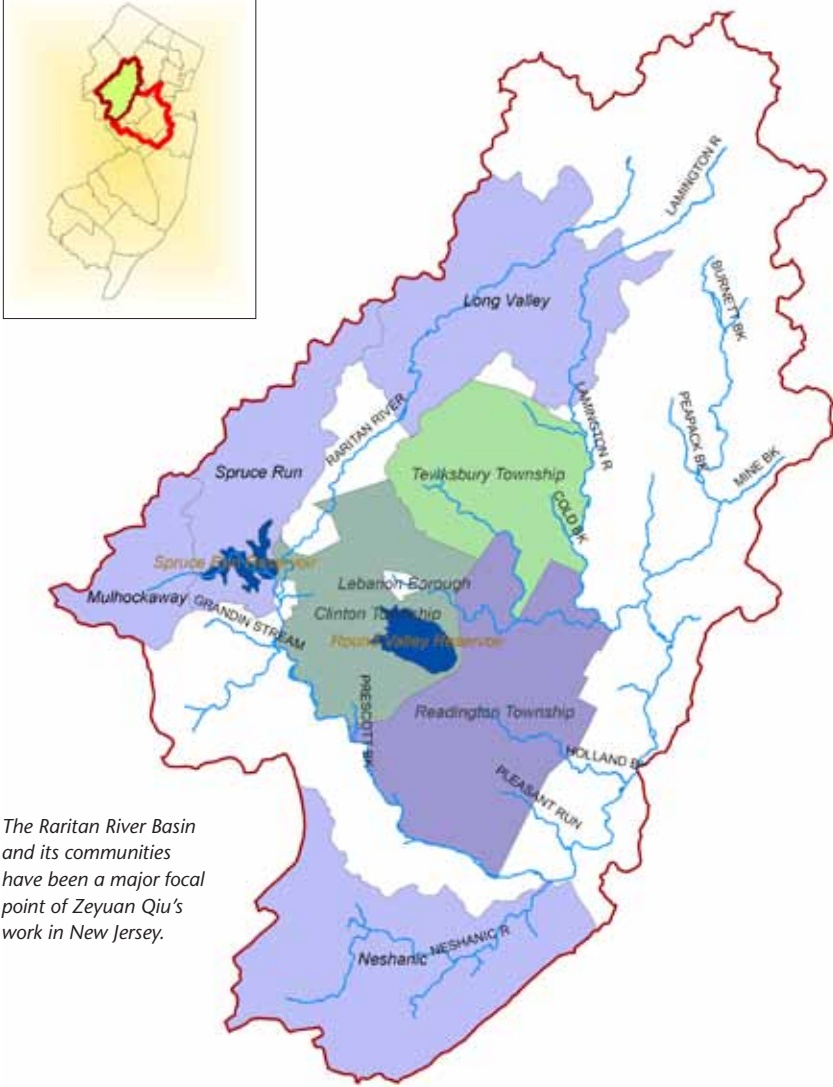
All of these New Jersey-based studies – as well as another focused on agricultural adaptation to future climate change in Montana’s Flathead River Basin – have been collaborative efforts with top researchers and conservationists

representing national and local organizations across the country. These include the University of Missouri, Rutgers University, Cornell University, the U.S. Geologic Survey Northern Rocky Mountain Science Center, USDA National Agroforestry Center, USDA National Resources Conservation Service, the New Jersey Water Supply Authority, North Jersey Resource Conservation and Development Council, Hunterdon County Soil Conservation District, and the South Branch Watershed Association.

But as part of the effort to address real-world issues affecting people who live and work in environmentally sensitive areas, all of Qiu’s projects have actively engaged residents of the communities involved. There have been public meetings to keep residents apprised of goals and progress, interviews with farmers and other landowners, and presentations of results and ideas to environmental commissions and land-use planning boards.

According to Qiu, his work has been well received by municipalities, and he adds that the response to the Rockaway Project was especially positive. “We presented a report to Clinton, Readington and Tewksbury Townships that these municipalities were able to include in their land-use master plan,” he says, referring to the areas surrounding the Rockaway Creek. The report contains a wide range of recommendations for sustainable land use, which Qiu hopes the municipalities will gradually implement in guiding future development. Further, he points out that the basic science and concept underpinning the report, which is often referred to as precision conservation, will lead to broader changes in the way we approach land-use and water-resource challenges.

As an economist, Qiu is always concerned with cost-effectiveness as well as environmental effects, which requires asking some tough questions: “How do we achieve environmental protection with the minimum cost to society? How can we achieve that goal in a budget crisis?” The results from his projects and research offer a way of thinking that can lead to the answers we need.



*The Raritan River Basin and its communities have been a major focal point of Zeyuan Qiu's work in New Jersey.*

## NEW PROPOSALS

Now that the Neshanic, Rockaway, Raritan Riparian and Montana projects are largely wrapped up, Qiu is energetically engaged in many other activities, including being back in the classroom at NJIT. “We’re developing new proposals, especially for precision conservation,” he says, noting that there are funding opportunities compatible with his research available through the USDA Agricultural and Food Research Initiative, the EPA STAR program and the National Science Foundation.

In addition to project-related activities, Qiu has served with many community, government and professional organizations and panels. Among them is the NJDEP Science Advisory Board, where he was appointed to the Ecological Processes Standing Committee. His expertise is also tapped by the USDA, which frequently invites him to participate in proposal reviews and workshops. He is the past president of the Firman E. Bear Chapter of the Soil and Water Conservation Society, a nonprofit scientific and educational organization that serves as an advocate for conservation professionals and for science-based conservation practices, programs and policy.

Last April, Qiu was the keynote speaker at the 24th Annual Mapping Contest sponsored by the NJDEP – a competition in which participants apply their expertise to creating maps of key resources in the Garden State. He was presented with the NJDEP Office of Science’s first annual Gail P. Carter Award for Best Application of Science and Geographic Information Systems.

Qiu has dedicated himself to writing as well. He has recently authored or co-authored papers that have appeared in the *Journal of Soil and Water Conservation*, *Journal of the American Water Resources Association* and *Environmental Management*.

Reflecting on his recent sabbatical, Qiu says that it was a very welcome opportunity. “I had the freedom to think, read, write, and meet different people. It also enabled me to be a representative of NJIT in many different situations.” Now, equally glad to be back in the



*Restoration and protection of New Jersey resources such as Walnut Brook in the Neshanic River Watershed is a key goal.*



*Agricultural, suburban and urban areas contribute contaminants to water resources.*

classroom, Qiu and his students are exploring the challenges of achieving a positive balance between people and vital natural resources. ■

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<http://chemistry.njit.edu>