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Yadu Pokhrel to use NSF CAREER Award to advance water resource sustainability and food security

The clock is ticking on the world’s freshwater supply. Yadu Pokhrel, assistant professor of civil and environmental engineering at Michigan State University, is concerned that with more than seven billion people on the planet, it is time to rethink how we use and manage freshwater systems.

Pokhrel will use a five-year, $500,000 National Science Foundation Faculty Early Career Development (CAREER) Award to continue his work in water systems management. The grant begins on June 1, 2018.

“The goal of this project is to advance the research and education of water resource sustainability in managed land-water systems,” Pokhrel said. “The project will use the Mekong River Basin in Southeast Asia as a testbed, where climate change, river flow alterations by proliferating hydropower dams, and seawater intrusion due to sea level rise are directly affecting agricultural systems, fisheries, and human livelihoods. The Mekong River Basin is home to 60 million people in six nations and hosts the world’s largest freshwater fishery.

“By using a suite of hydrological, agricultural, and ecological models, we can systematically examine the trade-offs between hydropower and irrigation upstream for food and energy production and adverse downstream effects on rivers, floodplains and groundwater systems,” he said.
While this project will be implemented in the Mekong River Basin, the long-term goal is to apply the newly developed modeling framework to other regions such as the Great Plains and the California Central Valley, where declining surface and groundwater systems and adverse impacts of climate change are posing serious threats to sustainable water supply and food production.

“It’s just a matter of time before declining water supplies and unsustainable management will undermine our ability to ensure an adequate supply of food, energy, and water for the rapidly growing global population,” he noted.

Read the NSF abstract.

University Distinguished Professor Venkatesh Kodur, chair of the MSU Department of Civil and Environmental Engineering, said Pokhrel’s CAREER Award is a prestigious recognition of his international advocacy.

“This award is particularly noteworthy because few NSF CAREER Awards are presented in civil and environmental engineering based on the kind of research conducted in our academic areas,” Kodur explained. “Yadu’s award is a first for our department and actually rather rare in the entire country. It honors the important work he is doing to study resource sustainability around the world.”

Pokhrel is the 16th faculty member of the College of Engineering to receive an NSF CAREER Award since 2010 and the third in 2018. It is the first for the Department of Civil and Environmental Engineering. NSF CAREER Awards support junior faculty who exemplify the role of teacher-scholars through outstanding research and education. It is among NSF’s most prestigious honors.

Using the CAREER grant, he will work to enhance current models to develop a new framework to advance the understanding of changing land-water systems toward developing adaptation strategies for sustainable water resource management and food security.

Part of Pokhrel’s NSF project will promote hydrology knowledge to high school and community college students, and teachers. The education program will include an interactive web-based version of the modeling system for classroom use, along with mentored research and training of international students through online initiatives.

“We need to strike a balance between the exploitation of water resources for increased food and energy production...
and the potential negative impacts our management practices can cause on natural system

Pokhrel is originally from Kathmandu, Nepal, where he studied civil engineering. He joined the MSU Department of Civil and Environmental Engineering as an assistant professor in August 2014,” he added.

His research interests are focused on improving the understanding of the changes in the terrestrial water cycle in response to the combined effects of human activities and climate change. In his past works, he has developed global and continental hydrological models to examine the impacts of climate change and human land-water management practices on freshwater systems in managed landscapes.

He earned a PhD in civil engineering (2011) at the University of Tokyo, Japan. Prior to joining MSU, he worked as a postdoctoral fellow at Hokkaido University, Japan, for six months before moving to Rutgers University, where he worked as a research associate from 2012 to 2014 and then as an assistant research professor from April-August 2014.

For more on his water research, visit the: MSU Multi-Scale Hydrological Modeling Lab.

Related Website: Communications contact: Patricia Mroczek

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