Louisiana EPSCoR
EXPERIMENTAL PROGRAM TO STIMULATE COMPETITIVE RESEARCH VOL.5 NO.11 NOVEMBER 2008

Fighting the Good Fight to Save LA Wetlands, Strengthen New Orleans Levees

The following is a continuation of a series on Louisiana EPSCoR's Pfund program, which provides seed money for the exploration of innovative or novel research by science and engineering faculty.

Dr. Aixon Hou

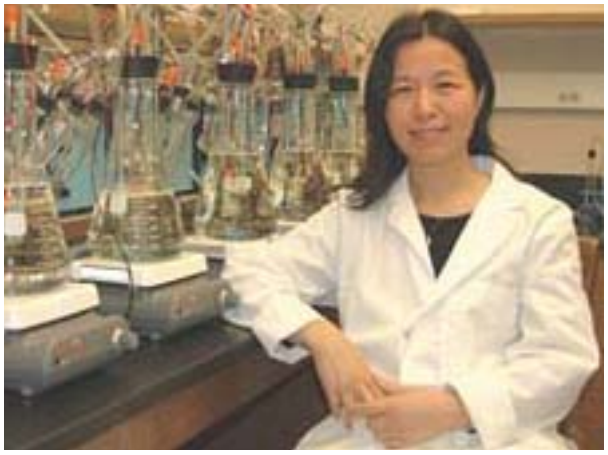
A Pfund research team's partnership with the U.S. Interior Department's National Wetlands Rexearch Center is expected to make a big impact on wetland restoration and environmental issues facing Louisiana and the Lower Mississippi Valley.

Included in the collaborative investigations are greenhouse emissions and hypoxia in the Gulf of Mexico.

Led by LSU Assistant Professor of Environmental Sciences Aixin Hou, the Pfund team employed cutting-edge molecular techniques to gain quantitative understanding of soil and structure changes that occur in the microbial community in the lower Mississippi Delta's restored forested wetlands.

According to NWRC Wetland Research Biologist Stephen Faulkner, this research will help fill important gaps in two of his current research projects, one on climate change, the other on agricultural watersheds in the Lower Mississippi Valley.

As a result of the LA EPSCoR Pfund project, Dr. Hou and her LSU collaborator, Dr. Irv Mendelssohn, a Professor of Oceanography and Coastal Sciences at the Wetland Biogeochemistry Institute, were the recipients of two grants. They included $268,498 from the University of New Hampshire and a $74,400 Coastal Science Assistantship grant from Louisiana's Department of Coastal Retoration and Management.



LSU Assistant Professor of Environmental Sciences Aixon Hou in her LSU laboratory.

"The Pfund grant has provided me a starting ground to develop cutting-edge techniques in the field of molecular biology...My lab will definitely continue to benefit from this technology-based capability," says Dr. Hou.

"The Pfund grant has provided me a starting ground to develop cutting-edge techniques in the field of molecular biology. The real-time methods established in my lab as a result of the grant have enabled me to successfully bring in new research projects," says Dr. Hou. "My lab will definitely continue to benefit from this technology-based capability."

Dr. Clinton Willson

River diversions are used in many parts of the world to divert water and sediment for flood control, irrigation, environmental enhancement and/or restoration.

Diversions in the lower part of the Mississippi River have been used primarily as a means for controlling salinity and nutrient levels in coastal wetlands. While valuable, these diversions were not designed to deliver much-needed sediments into the wetlands.

Recently, a number of organizations have put forth the concept of designing and constructing large-scale diversion structures capable of delivering large quantities of river-borne sediment into the wetlands.

Over the past several years, LSU researchers have been using a Small Physcial Scale (SSPM) to study the potential for diverting the lower Mississippi. The movable bed physical model is a valuable tool for studying large-scale diversions over long (decadal) time scales.

A LA EPSCoR Pfund grant competitively awarded to LSU Civil and Environmental Engineering Associate Professor Clinton Willson provided funding to begin development of complementary numerical modeling tools for more detailed studies.

These include the hydrodynamics and sediment transport in the river and out into the adjacent wetlands, impacts of diversions on the river, modeling of the finer sediments that can't be modeled using the SSPM, and the impacts of future sea level rise on the lower river.

"As a result of the Pfund grant, we were able to demonstrate our ability to perform high-resolution simulations on river and sediment diversions in the lower Mississippi," adds

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Dr. Willson. “This resulted in a $233,598 grant from the Louisiana Department of Natural Resources.”

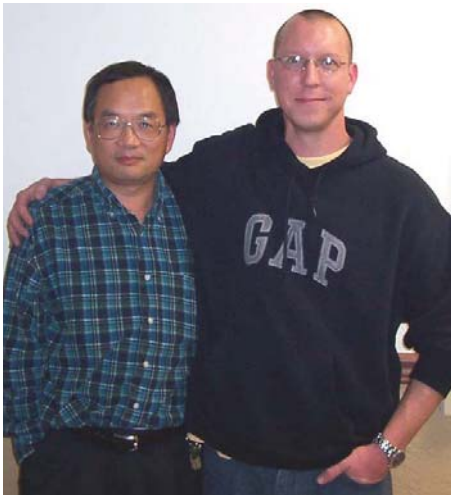
The research group was also invited to give presentations at the Sixth International Symposium on Coastal Engineering and Science of Coastal Sediment Processes, the 2007 Fall American Geophysical Union meeting, the 2008 First American Academy of Mechanics Conference, and the 2008 American Water Resources Association Annual Conference.

Dr. Xingran (Jay) Wang

A computational model to analyze and solve such engineering problems as the New Orleans levee failures, landslides and various soil-structure failures was developed in a 2006 Louisiana EPSCoR Pfund research grant.

“Our analysis results of the breached levee system at the New Orleans 17th Street Canal differ with some of the views indicated in the Interagency Performance Evaluation Task Force report commissioned by the U.S. Army Corps of Engineers, specifically in the gap formation between the flood wall and levee soils,” says Dr. Xingran (Jay) Wang, the Pfund recipient.

“We used our own computational finite element model—one of the major tools employed to analyze levees—which systemically analyzes the interaction between floodwall, soil and pore water, the water filling the spaces between grains of sediment," adds the Louisiana Tech University Associate Professor of Civil Engineering.



Dr. Xingran (Jay) Wang, Louisiana Tech University Associate Professor of Civil Engineering, left, and Mark Castay, a certified engineering-in-training and former undergraduate student of Dr. Wang who collected "a tremendous amount of information regarding the New Orleans levee failures."

“The particular value of computational finite element models lies in the theoretical developments that lead to a computational model to solve actual engineering problems. It’s a topic of particular interest to many researchers studying material-failures in different engineering disciplines."

A technical paper on the results of the Pfund research on the New Orelans levee has been published in the refereed journal, *Computers and Structures*. Another is being sent to the American Society of Civil Engineers' refereed journal for review.

Additionally, two conference papers on the project were presented in the summer of 2007 to the 4th Massachusetts Institute of Technology Conference on Computational Fluid and Solid Mechanics and to the 18th Engineering Mechanics Division Conference of the American Society of Civil Engineers.

"I really appreciate the Pfund, most of which was used to employ a graduate student who continues to conduct some pioneering research in infrastructure sheer failures," adds Dr. Wang.

Planning Grants Available

LA EPSCoR has five grant programs, all aimed at strengthening the competitiveness of the State’s university science and engineering faculty.

Highlights of two of those programs are:

Planning Grants for Major Initiatives for faculty who submitted a pre-proposal and received an invitation to submit a full proposal to a federal agency for a large-scale research and/or education program.

Preliminary Planning Grants for Major Initiatives for research teams developing a proposal, or required pre-proposal, to a federal agency for a large-scale research and/or education program.

Visit laregents.org and click on Programs for program specifics of the two Planning grants.

Louisiana EPSCoR
P.O. Box 3677
Baton Rouge, LA 70821-3677
#4475