

Project Summary

This proposal is being submitted to the NSF Small Grants for Exploratory Research (SGER) program based on the need for a quick response to a natural or anthropogenic disaster, in this case the flooding of New Orleans by Hurricane Katrina. The proposal is focused on the impact of the New Orleans dewatering operation on the Lake Pontchartrain ecosystem, with a particular focus on issues related to geochemistry, microbiology, and potential human health effects. The proposal is part of a collaborative study with the University of Hawaii and the University of Miami, both of which are centers of oceans and human health. LSU will provide logistical support for the Hawaii and Miami scientists and will collect and initially process samples for them if need be. LSU scientists will focus on several issues: (1) concentrations of *E. coli* and *Enterococcus* bacteria in Lake Pontchartrain, particularly in the vicinity of the 17th Street Canal discharge, (2) concentrations of heavy metals in sediments and fish tissue, with particular attention being given to methyl mercury, (3) the influence of the BOD and nutrients in the discharged floodwaters on the oxygen regime in the lake, (4) potential development of algal blooms, with particular attention being given to species that produce biotoxins, (5) circulation and mixing processes in the lake and their influence on the impact of the discharged floodwaters on the Lake Pontchartrain ecosystem. Companion studies will focus on viruses and protozoan pathogens (University of Miami) and *Vibrio*, *Staphylococcus*, and *Bacteroides* bacteria (University of Hawaii).

The **intellectual merit** of the proposed research is based in part on the fact that it is a timely response to a natural disaster virtually without precedent in the history of the United States. Public health concerns associated with this disaster relate to the presence of sewage-derived pathogens in the floodwaters, high concentrations of hydrocarbons associated with oil industry activity and the rupture of storage tanks, and heavy metals associated with vehicular traffic and industrial activity in the New Orleans area. Coincidentally, Lake Pontchartrain was one of the sites used by the EPA when it carried out the epidemiological studies that led to the present water quality criteria with respect to marine recreational waters. The EPA is presently carrying out a new round of epidemiological studies (currently focused on freshwater systems) based on the use of real-time PCR methods in response to the criticism that plate count methods for enumerating indicator bacteria take too long (24 hours). The high concentration of fecal pathogens in the New Orleans floodwaters will afford an excellent opportunity to compare traditional plate count and real-time PCR methods with each other and with the concentrations of known pathogens of both fecal and non-fecal origin. This is a remarkable opportunity to gain insight into the relationships between indicator organisms and pathogens and the impact of differential die-off in a system with a high signal-to-noise ratio.

The **broader impacts** of the study include its impact on the scientific workforce: the principal investigator is a female minority, and one of the four co-PIs is a female. The project will afford an opportunity for 5-10 graduate students to carry out scientific research. At least half of those graduate students will be female. We expect that the information we obtain on the relationship between indicator organisms and pathogens will be of great value to the EPA and public health organizations that are charged with setting water quality standards for the protection of human health.