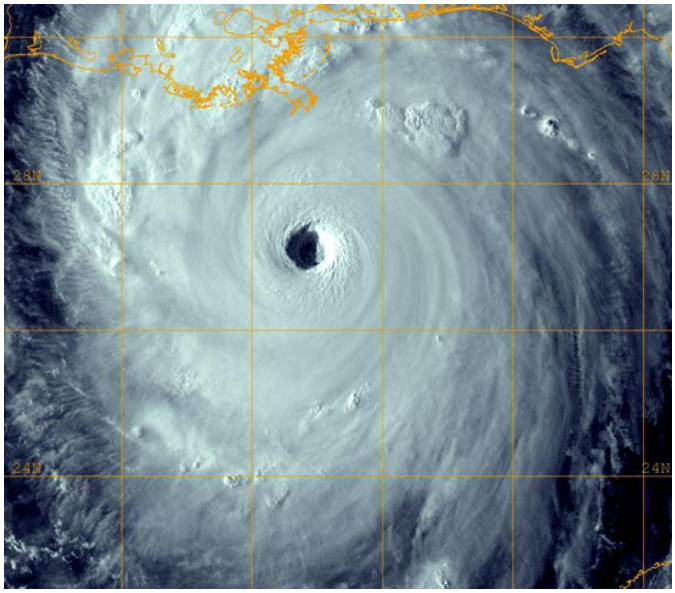

Waterway Alliance for Training in Environmental Research

(WATER) SUMMARY In 2005, the catastrophic aftermaths of Hurricane Katrina underscored projections by environmentalists that urban settlements proximal to coastal waters are particularly susceptible to deleterious changes in their ecosystems. Alarmingly, more than 40% of the US population lives in an urban center that is within 100 kilometers of coastal waters (http://sedac.ciesin.columbia.edu/es/papers) . This number is expected to rise sharply by 2030 to approximately two-thirds (Global Health Council, 2003). Not Cited In light of this, a port city like historic New Orleans presents an excellent testbed in which to devise comprehensive research and education programs, as well as, effective policy that promote the sustainability, resiliency, and biodiversity of urban ecosystems. Surmounting such challenges will require cross-trained individuals who are comfortable with working at the intersections of multiple disciplines including biology, urban studies and applied mathematics. Therefore, this TIP-IUES initiative, Waterway Alliance for Training in Environmental Research (WATER), with its origins in the Biology Department at Dillard University, is designed to foster a cadre of undergraduates who are well-trained in the use of multiple frames of reference to explore linkages between natural and built ecosystems and the human behaviors that drive environmental and natural resource changes. The deliverables of this initiative will be the design and implementation of an interdisciplinary urban environmental studies (IUES) concentration which will span four disciplines: biology/biochemistry, computer science, urban studies/policies, and applied mathematics. Specifically, WATER will support the creation of two courses (an introductory urban environmental studies course and an applied environmental microbiology), a student-driven, research projects, and an open-source platform (EnviroThursday) for fertile

exchange between the Dillard community, city official and city planners, and the lay public. Collectively, this proposed WATER initative will provide students with knowledge, processes, and perspectives from diverse disciplines to: (a) analyze complex bioenvironmental issues in educational, governmental, business, legal and scientific settings and (b) function as culturally competent and effective environmental professionals. Intellectual Merit The Dillard TIP-IUES synthesizes a concentration in interdisciplinary urban environmental studies on a well-articulated biological backbone with appendages from the social sciences and applied mathematics. This concentration will represent one of few models on an undergraduate campus whereby the rigor, depth and breadth the STEM discipline depend strategically on the social sciences and applied mathematics. The structure of the newly proposed curricular enhancements will not increase time to degree for biology majors, since newly developed courses will be used to fulfill existing social science and biology elective requirements. This project will lead to more critical and multidisciplinary approaches to inquiry and mastery of content knowledge in the field of environmental studies. Further, concentrators will be able to utilize the WATER initiative as a springboard to more in-depth research to model and address the unique ecological challenges concentrated within urban centers at or near sea level. Broader Impact WATER will foster interdisciplinary research and learning to: enhance the understanding of 21st century environmental challenges; provide solutions through innovative applications and communication; and inform policy and practice. WATER will prepare Dillard University's undergraduates to comprehensively engage bioenvironmental challenges that threaten the sustainability and resiliency of US Gulf Coast cities (in particular) and global urban centers (in general) via the employment of innovative models informed by the biological sciences, urban studies and applied mathematics. Utilizing the Gulf Coast as a backdrop, WATER will focus on the development of rigorous, discovery-rich approaches to model 21st century environmental challenges and the pursuit of authentic research to address them. By integrating the concepts and content knowledge from applied mathematics, economics and urban studies, WATER will represent the only initiative to comprehensively investigate the dynamic interactions between: the biological, physical, social, political, and economic contours of an urban center. WATER will equip our life science majors with a powerful arsenal to hold leadership positions as research scientists, policy analysts, environmental management officials, educators, restoration ecologists, conservation and field biologists, museum curators, business consultants, and political advocates worldwide. Furthermore, this initiative has the potential to increase student volume and flow between the undergraduate and graduate segments of the STEM pipeline, by exposing life science majors early on to career alternatives that fall outside of the health professions. At Dillard, the majority of students who pursue an undergraduate major in biology or chemistry do so as a means to gain entry into medical or dental school. The stark reality is that 60%-70% will change their mind by their junior year. We are confident that the WATER initiative will sculpt the career aspirations of a large percentage of these students, especially in light of the fact that Dillard's student population who mostly hail from New Orleans are very interested in environmental issues. Students who choose to pursue our environmental biology concentration will represent a cadre of students who will most likely choose to pursue graduate studies. The proposed courses, modules, instructional materials and educational software tools is expected to impact more than 100 students per year at Dillard University, a historically black institution. The proposed activities will increase faculty collaboration among the departments of Biology, Chemistry, Mathematics, and Urban Studies. Finally, the modular nature of the developed teaching materials will facilitate the dissemination

of the expected outcomes and would enhance the curricula at other institutions. The reliance on Google Sketchup, an open-source cross-platform computing environment, and other open-source software will also contribute to the broader impacts of this project. Dissemination of the generated teaching materials will be facilitated by establishing a web presence pages www.dillard.edu /WATER developed and maintained by the PI.