PART C. INTERNATIONAL SUPPLEMENT REQUEST

1. Expanding US-Mexican Cooperation in the Study of Hurricane Effects to the Greater Caribbean Basin

This joint supplement request between the Florida Coastal Everglades and Luquillo LTER programs seeks funds to expand developing cooperation with the Mexican LTR program. A supplement award to the Luquillo LTER in 2008 provided resources for a meeting of U.S. and Mexican scientists in Mérida, Yucatan that initiated a cooperative approach to the study of the effects of hurricanes on tropical forests. The meeting established a strong core group of researchers committed to establishing a network of sites and scientists to expand, improve, and synthesize research on hurricanes and their effects (see report at http://lno.lternet.edu/merida). Moreover, meeting participants agreed to develop two manuscripts, established working groups to prepare a proposal to the Research Coordination Network program, initiated a bibliography of research on Caribbean hurricanes, and began development of a web page that describes these achievements and the sites that will be involved in the new network. The success of the 2008 meeting has encouraged us to apply for additional funds for a second meeting. The goals of this second meeting will be 1) to complete the manuscripts under development, 2) to expand the working group to include additional ecologists and social scientists from the Greater Caribbean Basin, and 3) to maintain the momentum that the first meeting provided until we obtain longer-term funding.

Enthusiasm for the January meeting was great, and not all interested scientists could be included. Despite $6000 additional support from the Luquillo LTER program, available funds were insufficient to accommodate several potential participants. Moreover, the 20 participants identified more than 20 other scientists with relevant research programs on hurricanes in the Great Caribbean region. We therefore request funds for a second meeting that will 1) expand representation in the working group to include additional countries in the Caribbean and Central America with long-term research programs on hurricanes and their effects and 2) increase the number of social scientists involved to achieve a critical mass for interaction. This second meeting will be held in association with the 2009 Ecological Society of America meeting in Albuquerque, which will allow a greater number of participants. Ten individuals from the working group already plan to attend the ESA meeting, and thus will require only lodging and per diem for three extra days. Robert Waide from the Luquillo LTER program and the LTER Network Office in Albuquerque will coordinate the meeting.

Complete manuscripts - Participants outlined two manuscripts at the Mérida meeting. Although work on these manuscripts will continue via e-mail and videoteleconferencing, the participants agreed that an additional meeting would be needed to complete them. The first manuscript describes a conceptual framework for integrating hurricane science across the Caribbean region through a formal research network. Considerable discussion was necessary to develop a conceptual framework that can integrate science across the diverse ecosystem types and research histories represented by the network. However, a model emerged that normalizes hurricane
impact by its influence on cover or biomass of dominant structural components of the ecosystem, which could be applied similarly to dry and wet forests, mangroves, or near-shore marine ecosystems. Once derived, this impact index could be considered a driver of change in population number, species diversity or ecosystem function. The forms of these responses can then be examined across levels of organization, ecosystem types and histories represented by data available in the network in order to address factors controlling ecosystem vulnerability or resistance to disturbance. Participants committed to contributing to a manuscript providing examples that support this conceptual approach.

The second manuscript addresses the question of how we would redirect future work on hurricanes and their effects based on the state of our present knowledge. During the past 10 years, frequent hurricanes/tropical storms have affected all countries in the Caribbean with significant economic consequences. Site- and network-based ecological research needs to align with both basic scientific and public need for understanding, and where possible, mitigating the impact of hurricanes on natural and built infrastructure. However, most studies on hurricanes are opportunistic and focus on a few variables related as response of a single hurricane. They are typically uncoordinated with each other in terms of the identity of the variables and the scales at which they are measured. In addition, studies tend to focus on hurricane events as defined in terms of wind-power/barometric pressure on the Saffir-Simpson scale. However, the effects of precipitation associated with hurricanes may be more significant than the effects from wind, and therefore new characterizations of hurricane events need to be developed that incorporate wind speed, storm surge, and precipitation to appropriately measure the intensity, frequency, and extent of disturbances. Because of the importance of precipitation events leading to catastrophic flooding, the effects that hurricane have on ecosystems go far beyond the impacts associated with direct hits. Consequently, the domain of study should encompass broader temporal and geographical scales. To understand the consequences of these disturbances, we must incorporate socio-economic feedbacks. We suggest that to appropriately manage ecosystems, the full array of hurricanes effects at different time and geographical scales should be considered. This is impossible to achieve based on isolated and uncoordinated studies scattered across sites. Therefore, we need an integrated network of sites and scientists studying the long-term multi-scale effects of hurricanes.

**Expand working group** – Groups working on each manuscript independently concluded that the expansion of the research team to include additional ecologists and particularly social scientists was desirable. The conceptual framework underlying the first manuscript is based on techniques employed by economists to facilitate socioecological collaborations, and thus provides an excellent opportunity for cross-disciplinary research. The process of realigning our priorities for hurricane research must incorporate socio-economic feedbacks, which requires that additional expertise be added to the group. Thus, our request includes funds for six additional social scientists to participate in the proposed meeting.

**Maintain momentum** – The development of a coordinated network of sites addressing hurricane effects and responses depends on significant long-term sources of funding to permit coordinated field studies and model simulations. We propose to address this need through the development of a proposal to NSF’s Research Coordination Network program and similar programs available through the European Union. In the interim, the participants agreed that a face-to-face meeting was necessary to maintain momentum and to continue development of ideas that arose in the first
meeting. For example, there was considerable support for the development of a review paper or a special feature on the effects of hurricanes that would incorporate understanding from our network of sites as well as the conceptual framework discussed above. Furthering this effort would be one of the goals of the proposed meeting.