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January 10, 2012

Dear Friends

As professionals in diverse fields of environmental science, you are keenly aware of the water quality problems caused by both polluted runoff and the alteration of our coastal shorelines. You have likely participated in restoration efforts to return these altered shorelines to a more natural or stable condition and regain good quality of coastal waters. Yet, questions may still abound regarding how best to implement shoreline and water quality restoration, particularly in the face of rising sea levels. In response to a call for proposals from the National Estuarine Research Reserve (NERR) System Science Collaborative, Just Cebrian of Dauphin Island Sea Lab, Julia Cherry of the University of Alabama and I have proposed a unique research project: "Minimizing runoff nutrient pollution with marsh restoration in a world of rising seas."

A one page describing the project is included with this letter. Science Collaborative projects include not only strong research with results that can be applied to coastal management issues but also the integration of the needs of end-users. As coastal resources managers, you are a targeted end-user of products developed from this project. In that same role, you are uniquely suited to serve in the development of research outputs for the larger end-user community. With that in mind, we need your valuable input in shaping this project proposal and implementing its outcomes. We are asking for your participation in a Management Application Team (MAT). This team will have three main tasks. First, the MAT will be closely involved in the development of the project and implementation of research to guarantee relevant and useful deliverables for end users. We will call on your expertise during the two year project (if funded). Second, we will need your help to compile a broad list of potential end users in the region, with whom we will conduct at least one workshop to familiarize them with our research and introduce them to expected deliverables. Finally, we will create a decision-support tool presenting the cost-effectiveness of shoreline restoration in the treatment of nutrient runoff in the lace of rising sea levels. At this stage, your contribution will be critical.

Successful funding of the project requires that we include scientifically sound methods and that we integrate a variety of end-user perspectives so that the products are meaningful to coastal research managers. We need your participation and your perspectives. Please take a look at the one-pager attached along with this letter and consider our request for your help with implementing this project. The deadline to submit the pre-proposal is January 31, 2012. We would appreciate a letter of support for this proposal. A support letter template is also included with this letter.

We really hope you can accept our invitation. We are very excited to work with you. Please receive our most sincere gratitude

Michael Shelton
Watershed Coordinator

Just Cebrian
Dauphin Island Sea Lab

Dr. Just Cebrian
Senior Marine Scientist/Associate Professor of Marine Sciences
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Michael Shelton
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Dear Just and Michael:

On behalf of the (my organization), I am writing in full support of the project proposal titled "**Minimizing runoff nutrient pollution with marsh restoration in a world of rising seas**." In my role as coastal resource manager, I am acutely aware of the harmful impacts of nutrient-laden stormwater runoff on the function and health of our estuaries. Along those same lines, I know that any treatment or restoration conducted to reduce nutrient input from sources of runoff will have to account for the impacts of rising sea levels. The proposed project will provide important information to further our understanding of techniques to mitigate the harmful effects of nutrient pollution while still taking into account dynamic sea levels.

The proposed work is in alignment with the priorities of our organization, and the results of this work will no doubt be of interest to natural resource managers across the coast. I am committed to working with the applications management team to ensure a successful project. The collaborators in this project bring together strong research, publication and project management records within their respective fields and are well equipped to carry-out the proposed research endeavor. In addition, the collaborative process established by the research leads will guarantee for the team open avenues for communication and input into the development and implementation of the research and deliverables. I am pleased to be able to serve on the Management Application Team for this work and look forward to collaborating with the research team.

If you would like further information, I am more than willing to discuss my support for this collaborative research proposal.

Minimizing runoff nutrient pollution with marsh restoration in a world of rising seas

One of the end results of human conversion of coastal watersheds is an increase in nutrient pollution of coastal waters via storm water runoff. Runoff nutrient pollution is difficult to manage and/or avert due to the inherent stochastic nature of the process and the many factors that influence it. With this project, we intend to develop a cost-effectiveness analysis of the use of black needlerush marsh conservation and restoration to reduce nutrient pollution of coastal waters via storm water runoff. When runoff from the upland arrives in the marsh, the runoff percolates in the marsh soil and becomes groundwater. In its travel towards the marsh seaside edge, the groundwater plume traverses the marsh rhizosphere (i.e. an underground dense network of stems, roots and microbes), where much of the nutrients carried out by the plume are absorbed, processed and cleaned out by the marsh plants and the inhabiting microbial community. Here we will examine the cost-effectiveness of several marsh restoration designs (i.e. how much nutrient pollution can be removed throughtout a desired time span in relation to the cost of the initial planting efforts and maintenance of the restored marsh). Figure 1 shows examples of some potential designs.

We will do this in the context of the current rise in sea level. Excessive inundation due to rising sea level can lead to wetland loss as vegetated areas convert to open water. Here we will text how realistic predictions of sea level rise for the Northern Gulf of Mexico can affect restored marshes and, by default, their capacity to filter runoff nutrient pollution. To do this, we will manipulate the depth and duration of tidal flooding according to those predictions in half the restored marsh plots, whereas we will leave the other half unaltered (i.e. natural flooding). We will use weirs to control the depth and duration of tidal flooding, and the comparison between "with weir" and "without weir" restored marsh plots will allow us to elucidate how increasing sea level affects runoff nutrient interception by different marsh restoration designs.

We will develop a decision support tool based on the results of the cost-effectiveness analysis under increasing sea level that will guide users on how marsh restoration can be best used to eliminate runoff pollution as well as what sort of adaptive measures can be implemented in future efforts as the sea rises. To ensure real applicability of our results and construction of a successful decision support tool, we will work with a Management Application Team (MAT) that will be closely connected with the research at all times. First, MAT will decide on the format, periodicity and venues of communications and iterations among all project participants. We will have a minimum of two meetings every year involving all participants, but more frequently among subsets of participants as dictated by their specific needs. Second, MAT will tailor the experiments as best suited to address and resolve their specific needs. Specifically, they will work with the researchers to determine marsh restoration designs, mimicked sea level, and levels of runoff pollution applied to the restored marsh. Finally, MAT will be a key part in the development and dissemination of the decision support tool, deciding on how the tool should interact with users and what specs it should have.

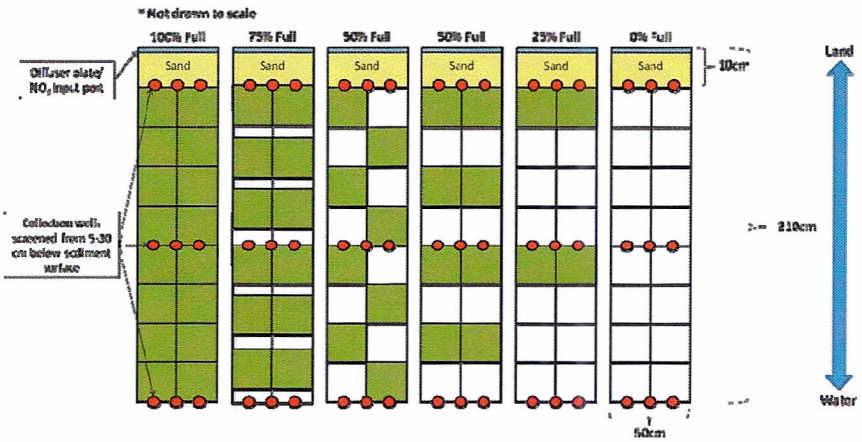

Figure 1. ***Diagram of different restoration designs. Shaded quadrats within the parcels represent planted marsh and open quadrats represent bare sediment***