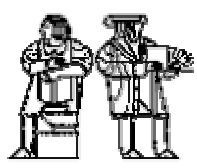


Caribbean Research Association for the Betterment of water resources



Department of Civil & Environmental Engineering
Master of Engineering Program

USVI Wetlands Association
c/o Dr. Peter Shanahan and Ms. Daniele Lantagne
Massachusetts Institute of Technology
MIT Department of Civil and Environmental Engineering
Master of Engineering Program

Dear Dr. Shanahan and Ms. Lantagne;

Caribbean Research Association for the Betterment of water reSources (CRABS) is writing in response to your request for proposal dated September 2002 regarding water quality of salt ponds and watershed management in the U.S. Virgin Islands. After reviewing your request, CRABS has assembled a team of engineers and scientists to address your concerns regarding the water quality status of wetland areas and watershed management on the islands of St. John, St. Thomas, and Haiti due to an increased need for this information by local managers, contractors, and planners. Team members from CRABS have the experience necessary to provide quality and comprehensive solutions for the USVI Wetlands Association. Our experience lies in water quality analysis, watershed modeling and analysis, groundwater and sediment analysis, geographic information systems application, and water resources master planning.

Knowing that wetlands and water resources are precious and scarce on the U.S. Virgin Islands, CRABS will not only gather data to assess the present conditions, CRABS will also address the salt ponds water quality, the St. John desalination plant, and the overall water resources strategy for the US Virgin Islands and Haiti. A description of the proposed study is outlined in the subsequent paragraphs. We look forward to submitting our full proposal by December 6, 2002.

WATER QUALITY

Salt ponds in the U.S. Virgin Islands are a valuable resource, serving as a vital ecosystem between the sea and the freshwater on the island. Threats due to increased development and tourism in the form of nutrient deposition, increased traffic, and waste disposal have

had increasing effects on these wetlands over the past century. Key stakeholders have identified a need to quantify the impacts of economic growth on the natural balance of the islands and the National Park. CRABS proposes to send a skilled team of engineers to focus specifically on Salt Pond preservation.

The team will first perform sampling and conduct an in-depth inventory of salt ponds and their characteristics. The sampling will investigate water, sediment, and biota in salt ponds on the island of St. John. Detailed watershed modeling will provide additional insight into the current state of the Salt Ponds.

After the current state of the Salt Ponds has been thoroughly analyzed, the team will quantify the various impacts of factors affecting the wetlands. A detailed review of ecological impacts of salt ponds in their current state, as well as the development of goals for the future, will provide stakeholders with vital information on preserving ecological balance on the islands. Finally, the team will provide recommendations to optimize the water quality of the Salt Ponds, thereby preserving natural plant, animal, and aquatic life.

Don Rose is a hydrologist with over two years of experience modeling watersheds, performing detailed sampling and analysis procedures, and developing mitigation strategies. Mr. Rose has extensive experience dealing with the specific issues of concern in watersheds of tropical climates. Mr. Rose has a BS in Civil Engineering Systems from the University of Pennsylvania, and is currently a candidate for a Masters of Engineering in Environmental Engineering from MIT. Mr. Rose will be focusing on detailed watershed modeling and analysis, as well as future impact assessment.

Liam Bossi, an environmental engineer and conservationist with a background in chemical engineering and organic chemistry, will work to assess the water quality of the salt ponds and investigate the influence of the island's burgeoning development on the salt ponds. While his focus will be on chemical analysis, the ecological aspect of the salt pond will also be given considerable attention. Mr. Bossi has a degree in Chemical Engineering from the Massachusetts Institute of Technology, and is currently a candidate for a Masters of Engineering in Environmental Engineering from MIT.

Alexa Gangemi will serve as the project manager overseeing the engineering efforts of the CRABS team on the Salt Ponds project. Ms. Gangemi will be specializing in wetlands ecology and species preservation; her participation in the project will focus on the ecological impacts of Salt Ponds as well as mitigation strategies. Ms. Gangemi will conduct an assessment of current ecological impacts and develop long-term plans to sustain vital ecosystems. Ms. Gangemi has a bachelor's degree in Mathematics from Cornell University and is also a candidate for a Masters of Engineering degree in Environmental Engineering from MIT.

DESALINATION

The process of desalination in the US Virgin Islands provides a large portion of potable drinking water to the islands' citizens. Desalination is usually a last resort for drinking

water treatment because of the high cost per unit water produced by the process. These costs often can contribute substantial annual costs to a government's total budget. CRABS proposes to send a skilled water resources engineer to help the US Virgin Island's governments evaluate their current desalination process and suggest improvements to reduce overall costs and maximize plant efficiency.

The engineer will first perform an in-depth analysis of the current desalination techniques through a literature review and then examine the current processes in use in the US Virgin Islands. After this preliminary assessment a detailed examination of the overall operational process will be conducted. This will possibly include water sample analysis, energy cost analysis, and operational procedures.

After the current state of the desalination processes has been thoroughly analyzed, the engineer will summarize the various impacts of factors affecting the process. A detailed report will help plant engineers and management understand the engineer's findings and recommendations. This analysis will provide CRABS with valuable research that can be applied to further research aimed at maximizing the efficiency of other desalination plants.

Chad Stevens will serve as the lead engineer in the effort to optimize the U.S. Virgin Islands desalination process. Mr. Stevens is a water resources engineer specializing in the desalination processes used for drinking water treatment. He has had extensive experience examining, inspecting, and analyzing numerous types and sizes of drinking water treatment processes. Mr. Stevens has a BS in Environmental Resource Management with a minor in Environmental Engineering from Pennsylvania State University, and is also a candidate for a Masters of Engineering in Environmental Engineering from MIT.

Michelle Miilu will study the possibility of making desalination viable for Haiti. Due to lack of infrastructure in Haiti, small-scale solar power is a growing source of energy for Haitians. Currently, individual-use solar powered desalination exists and Ms. Miilu will investigate the physical and economic feasibility of upscaling this design to meet water supply needs in Haiti. Ms. Miilu is currently a Masters of Engineering student at MIT with a Bachelor of Science degree in Natural Resources and Environmental Science from Purdue University. She has 4 years of experience in environmental compliance working for the Alabama Department of Environmental Management.

WATER RESOURCES EVALUATION

Water sources are scarce on the U.S. Virgin Islands and Haiti due to increased development, poor economic conditions, and the natural geology and climate. Because of this, CRABS intends to analyze St. John's, St. Thomas', and Haiti's water resources both from an economic and environmental standpoint. Based on this analysis, we plan to develop strategies for water reuse and watershed management. The engineers will first examine the current status of water resources on the islands by gathering data from local

government agencies and local industry. Then, we will develop alternatives for each of these islands.

Genevieve Brin will investigate water resources management in Haiti. She will use the Integrated Water Resources Management (IWRM) technique to evaluate the present the efficiency of present water uses and potential developments. She will analyze past projects to understand their successes or failures. Based on these analyses, she will look at a particular project in the Jolivert area. She will develop a strategic plan for the growth of a chlorine generator project into the surrounding communities. Ms. Brin is presently a Master of Engineering student, with special interest in water resources management in developing countries. She has international cooperation experience and she holds a Civil Engineering Bachelor degree from Polytechnique of Montreal University, Canada.

Pablo E. Buscemi will conduct research on “benchmarking” of Integrated Water Resource Management (IWRM) on the U.S. Virgin Islands. By analyzing characteristics of overall water supplies, overall water demand, and present water resources management, and identifying stakeholders in the water market, he intends to propose a framework for action towards sustainability of water resources on the islands. Having a clear idea on where water resources elements stand today will allow a forecast of future path of water resources development. His intent thus will be to achieve a view that, considering the island’s socioeconomic and cultural characteristics, can provide innovative solutions for the future, as well as adapt traditional solutions to manage the water resources in this particular case. He will try to reach to conclusions that could be applied to a typical Caribbean island’s water resource management. Another important issue that will be developed jointly with other team members is to unify modeling criteria for enabling a comparison between water resources management in a developed society and its counterpart in the most underdeveloped country in the Caribbean, Haiti. Mr. Buscemi is currently a candidate for a Master of Engineering in Environmental Engineering degree at MIT and graduated as a Civil Engineer from the Universidad Catolica Argentina de Buenos Aires. In addition, he has thirteen years of experience as a designer and contractor of water resource systems.

Heather Cheslek is an environmental engineer with over three years of experience in the water resources area performing various watershed analyses throughout the United States. She has a Bachelor of Science degree in Civil Engineering from Michigan State University and is a candidate for a Master of Engineering in Environmental Engineering degree from MIT. Ms. Cheslek will focus her efforts on determining and quantifying the water use on both the St. John and St. Thomas islands by analyzing past water records from the Department of Public Works and major stakeholders in order to provide water reuse strategies specifically to minimize the need for desalination and to identify lavish water use practices.

The project will require 3200 hours of professional staff time to complete. Copies of the team members resumes are attached highlighting the relevant qualifications of each member. Should you have further questions regarding the tasks described in this letter, please do not hesitate to contact us. A website will be developed and maintained

throughout the project duration in order to maintain an open relationship with concerned citizens. This website will have information regarding data, relevant documents, and project progress updates. By utilizing information from the U.S. Virgin Islands and Haiti to assist us in fulfilling the project goals, our hope is that this project contributes, at least to some extent, to the betterment of environmental conditions not only for our own time, but also for generations to come.

Thank you for your time and consideration. We look forward to submitting our full proposal by the December 6, 2002 deadline and working with you in the near future.

Sincerely,

Genevieve Brin
Liam Bossi
Pablo Buscemi
Heather Cheslek
Alexa Gangemi
Michelle Miilu
Donald Rose
Chad Stevens