



SEMI-ANNUAL REPORT

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Presented to:
National Science Foundation
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The U.S. Virgin Islands received a Research Infrastructure Improvement (RII) grant from the National Science Foundation (NSF) Experimental Program to Stimulate Competitive Research (EPSCoR) in 2003. As a result of investments made by the Virgin Islands EPSCoR program (VI-EPSCoR) in its first three years, the Virgin Islands are now seeing significant improvements in the territory's ability to support and manage competitive research in the area of coral reefs and related ecosystems. This semi-annual report for July through December 2006 highlights some of the exciting activities and achievements that have been possible because of VI-EPSCoR infrastructure investments.

VI-EPSCoR's research thrust is on the Biocomplexity of Caribbean Coral Reefs (BCCR). The marine environment of the Virgin Islands is among the most valuable in the territory's inventory of natural resources, and maintaining its integrity is an important factor in the territory's continued social and economic viability.

VI-EPSCoR investments in research facilities have enabled significant expansion of marine research and coral monitoring programs at the University of the Virgin Islands (UVI) and facilitated new collaborations with external researchers as well as stronger partnerships with federal and territorial resource management agencies. VI-EPSCoR has supported renovations of UVI marine research facilities, significantly increasing the territory's ability to support competitive marine-related research. The physical renovations at the MacLean Marine Science Center (MMSC) on St. Thomas include renovations of four research labs, a new sea table containment system, a teaching lab, office space for additional researchers, a video conference room and new dive facilities. The renovations at the Virgin Islands Environmental Resource Station (VIERS) on St. John include a new analytical lab, semi-wet lab, wet lab, office and library, and a new structure to house the compressor tank filling station, workshop, generator and chemical storage. VI-EPSCoR also funded the acquisition of a new Island Hopper research vessel (a 30 foot motor boat equipped with the latest radar, sonar, communication and navigation equipment) which is being used extensively for marine research and coral monitoring by UVI and visiting researchers. VI-EPSCoR investments have created new opportunities for collaboration with partner organizations including: United States Geological Survey (USGS), National Oceanographic and Atmospheric Administration (NOAA), the Virgin Islands National Park, the Virgin Islands Department of Planning and Natural Resources, and a number of other universities.

VI-EPSCoR funds leveraged with an NSF Field Station and Marine Lab grant have supported extensive renovations and modernization of the Virgin Islands Environmental Resource Station (VIERS), an important historical field station located in the Virgin Islands National Park on St. John. VIERS has served as an important field station for marine scientists for 40 years. For example, during the 1960s, it was the home base of Project Tektite, an underwater habitat for marine research. In 2001, a hurricane critically damaged the VIERS research facilities. With the new



renovations, VIERS is once again operational as a research station. In the past year VIERS has hosted researchers from UVI, Virgin Islands National Park, USGS, NOAA, California State University at Northridge, Auburn University, University of Central Florida, Eckerd College, Murray State University, and others. In November, VIERS hosted the “Science in the Park” international conference marking the 50th Anniversary of the Virgin Islands National Park and 40th Anniversary of VIERS. The conference brought a number of renowned researchers back to St. John to discuss the importance of VIERS and the National Park as a premier field laboratory for coral reef research. Research recommendations from the conference have been communicated to the NSF and will be published this spring in *Science*.

VI-EPSCoR investments in equipment have spurred new research directions and collaborations. For example, in 2004 VI-EPSCoR purchased several Acoustic Doppler Current Profilers (ADCPs) for oceanographic monitoring. In a collaboration between oceanographers and marine biologists, the ADCPs have been deployed at grouper and snapper spawning aggregation sites to collect baseline data on water temperature, current speed and direction at different depths in order to predict patterns of current-driven transport of eggs and larvae from spawning aggregation sites. The use of the ADCPs has led to exciting new incubator research directions related to coastal processes, such as a collaboration with the Virgin Islands Coral Reef Monitoring Program and the Virgin Islands National Park in which the ADCPs are used to study coral spawning. BCCR researchers have particular comparative advantage in studying coastal processes because of the easy accessibility to coastal regions around the Virgin Islands. Because of the importance of the coastal processes studies, VI-EPSCoR is funding the acquisition of new tools specifically designed to monitor near-shore conditions. The purchase of a high-resolution Conductivity-Temperature-Depth instrument and an Acoustic Wave and Current Profiler suitable for deployment close to shore enable researchers to verify high resolution coastal modeling efforts and will greatly enhance and increase likelihood of success of several incubator research projects focused on coastal processes.

A new VI-EPSCoR funded incubator project, a collaboration between Dr. Linda Walters of the University of Central Florida and Dr. Teresa Turner of UVI, was made possible by recent VI-EPSCoR infrastructure investments. Walters was among the first external researchers to benefit from new renovations at MMSC and VIERS. The collection of data on foraging *Diadema* sea urchins and how they impact algal biomass on coral reefs was greatly aided by the new dive facilities at MMSC and VIERS, as well as by the new research vessel; the work also benefited from the new sea table containment systems at MMSC. Visiting researchers like Walters offer as much as they receive. While in residence, Walters gave VI-EPSCoR seminars geared specifically towards undergraduate students at UVI. She and Turner also worked with two UVI undergraduates throughout their research, both of whom have presented posters as a result of this work; one student is third author on a poster accepted for presentation at The Society of Integrative and Comparative Biology’s 2007 meeting.



VI-EPSCoR incubator grants are developing new research directions, strengthening research skills of faculty and student researchers, and advancing research to the point at which it can attract competitive external funding. For example, in 2005 VI-EPSCoR awarded a \$10,000 incubator grant to Dr. Paul Sikkel of Murray State University, Dr. Donna Nemeth of UVI, and Ms. Amber McCammon, a UVI undergraduate, to examine the effects of habitat on parasite loads in reef-associated fishes. Outputs from the project to date include papers for *Coral Reefs* (in press), *Caribbean Journal of Science* (submitted), and *Journal of Parasitology* (in preparation), and presentations to several local, regional and international conferences, meetings and symposia including the 50th Anniversary Conference on Research in the Virgin Islands National Park and the 59th Annual Meeting of the Gulf and Caribbean Fisheries Institute. The grant has also provided important research opportunities for the student assistant, enabling McCammon to conduct research throughout the U.S. and British Virgin Islands and to learn a variety of field and laboratory techniques. McCammon has developed an impressive set of research skills, has built collaborations with numerous scientists, and has taken the initiative to create and pursue research questions within the scope of the project. The opportunity granted for this particular student has made a significant impact on her career development and preparation for graduate school. The incubator research has also led in several exciting directions; the researchers have successfully obtained grants for further work from the Virgin Islands Water Resources Research Institute and Earthwatch Institute and pre-proposal funding from Oregon Sea Grant, and have proposals in preparation to Oregon and Puerto Rico Sea Grant programs.

VI-EPSCoR has been working closely with UVI Information and Technology Services (UVI ITS) in infrastructure investments to strengthen the university environment for research, primarily in the areas of internet connectivity, network design and security, and storage and backup solutions for researchers. The importance of these investments are illustrated by the recent implementation of Dr. Nasseer Idrisi's HYCOM computer system for high performance ocean modeling in collaboration with researchers from the Rosenstiel School of Marine and Atmospheric Science at the University of Miami. When the model was first being installed, necessary large datasets, such as climatology data files for forcing the model, could not be transferred from Miami over UVI's existing Internet connection because it lacked the capacity to handle such large amounts of data. VI-EPSCoR's support for some of the transitional costs of increasing connectivity now permits VI-EPSCoR researchers to periodically access almost all of UVI's Internet capacity to download or upload large datasets. On-going improvements in network design and security and implementation of storage and backup solutions should create a much more robust modeling environment that will make the technical environment invisible to the researchers. VI-EPSCoR will continue to work closely with UVI ITS to develop longer term support solutions for HYCOM and other IT-intensive research needs.



VI-EPSCoR support provides researchers with access to library materials not available at UVI or through UVI's existing electronic resources. For example, as a part of their VI-EPSCoR incubator proposal, Drs. Teresa Turner and Tom Archibald of UVI requested funding to travel to Woods Hole Oceanographic Institute (WHOI) to use their library facilities. Instead, VI-EPSCoR and UVI ITS negotiated with the WHOI library and, for what it would have cost to send the two researchers to Cape Cod, were able to purchase a year's access to WHOI library cards for twenty VI-EPSCoR researchers, allowing them to have full electronic access to the library's resources.

VI-EPSCoR initiated implementation of project management software and training to support research management. VI-EPSCoR and UVI ITS have implemented the use of MS Project in support of VI-EPSCoR planning, monitoring, and evaluation activities. VI-EPSCoR staff are now learning how to use the software and inputting various components of the VI-EPSCoR operational plan. The VI-EPSCoR implementation is a pilot project for broader use of MS Project at UVI. VI-EPSCoR is supporting the software costs for the pilot implementation; UVI plans to transition to enterprise-level implementation of the software for university-wide application.

VI-EPSCoR funded the successful development of a new Master of Arts in Mathematics for Secondary Teachers approved by the University of the Virgin Islands Board of Trustees in March 2006. The program is designed to advance and deepen the knowledge of mathematics teachers. Classes began on UVI's St. Croix campus in June 2006. The Virgin Islands Department of Education is a major supporter of this degree program, providing full scholarships for all 18 Virgin Islands public school teachers participating in the first cohort. The program is being tailored to the needs of practicing teachers. Most coursework takes place during the summers when K-12 schools are not in session. At the request of the Department of Education, additional courses have been developed to ensure that all entering teachers are fully prepared for graduate work. Graduates of the program will be highly qualified as mathematics teachers at the secondary level.

VI-EPSCoR funded the successful development of a new Master of Marine and Environmental Science approved by the University of the Virgin Islands Board of Trustees on November 11, 2006. This exciting new multi-disciplinary graduate program will be offered through the Division of Science and Mathematics and the Center for Marine and Environmental Studies beginning in Fall 2007. The program will offer advanced training in science and natural resource management. It is designed to meet the acute demand for science and resource management expertise within the territory and the wider Caribbean. Potential employers such as local government and non-government agencies have expressed strong interest in hiring graduates of the program. Interest is great among potential students in the territory, most of whom have indicated that they wish to remain in the territory to work after graduation.



VI-EPSCoR has facilitated the development of a new educational advisory board to link the territory's K-12 and postsecondary educational institutions and the Virgin Islands community in a partnership to strengthen K-12 STEM education. In Fall 2006, VI-EPSCoR, the President and Provost of UVI, and the Virgin Islands Commissioner of Education constituted a new educational advisory board. Members include representatives of UVI and the Department of Education, potential employers in the private and government sectors, parents of secondary school students, and VI-EPSCoR. The Board is charged with identifying priority areas where K-12 STEM education can be strengthened; developing a plan of action; promoting collaboration and the formation of strategic alliances to make optimal use of existing and potential resources; and promoting private sector and community involvement.

VI-EPSCoR is participating in and supporting a variety of professional and educational events in the Virgin Islands to promote partnerships and build collaborations with key local government agencies and private organizations. For example, in October 2006 VI-EPSCoR, UVI and The Virgin Islands Department of Planning and Natural Resources (DPNR) collaborated to host a workshop on the "Status of USVI Coral Reef Ecosystems" held in conjunction with the 16th annual U.S. Coral Reef Task Force (CRTF) Meeting. By combining the efforts of a local government agency with UVI and VI-EPSCoR, the workshop became a venue for building relationships and generating ideas for future collaboration. The workshop was open to the public and was specifically aimed at local stakeholder groups. Recommendations from the workshop were presented to the Coral Reef Task Force, which passed a resolution offering support to the Government of the Virgin Islands for the further review, analysis, development and implementation of those recommendations. The workshop and the CRTF meeting were attended by representatives of all federal agencies funding U.S. coral reef research including NOAA, the U.S. Department of Agriculture, and the U.S. Department of the Interior, and representatives from other U.S. coral reef jurisdictions and associated states such as American Samoa, Hawaii, Palau and the Marshall Islands.

The Virgin Islands community has recognized the value of the VI-EPSCoR program by increasing financial support for VI-EPSCoR. In 2006, VI-EPSCoR received a \$400,000 appropriation from the Legislature of the Virgin Islands to support the program; local private donations in support of the program also increased.

In summary, the infrastructure investments of the current Research Infrastructure Improvement grant are building a sound foundation for growth in the research thrust on Biocomplexity of Caribbean Coral Reefs. Research facilities and equipment and IT capabilities at the University of the Virgin Islands have been significantly upgraded in support of the research thrust. In addition to new full-time research faculty and staff, UVI teaching faculty from biology, marine biology, physics, chemistry, and computer science are now participating in the research thrust. Research resources at UVI are being augmented by new partnerships with other research and resource management organizations and by collaborations with other universities. A new graduate program



in marine and environmental science will strengthen the research and teaching environment at UVI, and will produce graduates with skills in research and natural resource management tailored to local needs. A new graduate program in teaching mathematics for secondary teachers and a new educational advisory board link UVI with the school system in efforts to strengthen K-12 STEM education. The investments made by the Virgin Islands EPSCoR program in its first three years are creating significant improvements in the territory's ability to support and manage competitive research in the area of coral reefs and related ecosystems.

Further details on the program may be found in the second VI-EPSCoR Annual Report submitted to the National Science Foundation in May 2006.

Changes in personnel

Dr. Meri Whitaker (Ph.D., Agricultural Economics, Stanford University) was named VI-EPSCoR Project Director in June 2006.

Ms. Elizabeth Ban (M.E.M., Conservation Biology, Yale University) joined VI-EPSCoR in October 2006 as Program Coordinator.

Dr. Sylvia Vitazkova (Ph.D., Ecology, Evolution, and Environmental Biology, Columbia University) joined VI-EPSCoR in May 2006 as Graduate Coordinator for the new graduate program in marine and environmental sciences.

Dr. Paul Butler-Nalin (Ph.D., Higher Education Administration and Policy Analysis, Stanford University) joined VI-EPSCoR in 2006 as Consultant for Planning, Monitoring and Evaluation.

Ms. Maria Dillard (M.A., Sociology, East Carolina State University) joined VI-EPSCoR in July 2006 as Communications Outreach Manager.

Mr. Eoghan Joyce, Research Project Manager, has left VI-EPSCoR.

Ms. Marilyn Henderson, Administrative Assistant, has left VI-EPSCoR.

Mr. Matt Lucas joined VI-EPSCoR as a visiting Research Assistant from Southeast Missouri State University where he is pursuing his M.S. degree in Biology. He is working with Dr. Sandra Romano on research using DNA sequences for analyses of higher level relationships among the hard corals.

Ms. Jacqulyn Calnan (M.S., Conservation Biology, Columbia University) joined VI-EPSCoR in November 2006 as a Research Analyst working with Dr. Tyler Smith on coral reef monitoring.