

Vermont EPSCoR Document for Committee on Envisioning the Environment

October 24, 2012

1. *Your niche and contribution to environment-related teaching, research or outreach at UVM*

Vermont EPSCoR is funded by NSF EPSCoR to build science infrastructure for the state of Vermont. We invest in human, physical and cyber infrastructure to make investigators in Vermont more competitive for federal funding. We develop cutting edge research programs of transdisciplinary teams that draw investigators from across the UVM campus, other institutions of higher education, non-profits, non-governmental organizations and the private sector. Together we carry out research that has positive economic impacts on the state and region. It is important to note that VT EPSCoR is a state-wide program, and while UVM is the fiscal agent, we help UVM reach far beyond its campus to impact state science and engineering infrastructure, STEM workforce, and diversity. We are one of the most important yet under-appreciated assets for developing good will toward UVM.

The broader impacts of VT EPSCoR research must include STEM work force development, STEM workforce diversity, engagement of the lay public especially school teachers and students, stimulation of innovation in the private sector, building the cyberinfrastructure for cutting edge research and education, and rigorous assessment.

Our work must be congruent with the State Science and Technology Plan, the initiatives of the University of Vermont, and the Vermont Technology Council that is our governing board. We reach out to and involve stakeholders across Vermont and the region.

Our current research is on Adaptation to Climate Change in the Lake Champlain Basin: New Understanding through Complex Systems Modeling. The current grant is the largest grant to a PI in UVM history. In addition, we have had 2 other concurrent grants to build the first fiber network in the North East with a consortium of 5 EPSCoR states, to provide greatly enhanced bandwidth to the Vermont State College hub, and bring Internet2 network resources to all schools, libraries, museums and other institutions in Vermont.

Table1: RACC Researchers

Last Name	First Name	Institution
Adair	Carol	University of Vermont, RSENR
Bacchus	Tania	Johnson State College
Beckage	Brian	University of Vermont, Plant Biology
Bomblies	Arne	University of Vermont, CEMS
Bowden	William	University of Vermont, RSENR
Chu	Kelvin	University of Vermont, Physics
Dewoolkar	Mandar	University of Vermont, CEMS
Druschel	Gregory	University of Vermont, Geology/Indiana University-Purdue University Indianapolis
Dupigny-Giroux	Lesley-Ann	University of Vermont, Geography
Erickson	Jon	University of Vermont, Gund, RSENR
Genter	Robert	Johnson State College
Hill	Jane	University of Vermont, CEMS
Hurley	Stephanie	University of Vermont, Plant Biology
Kanat	Les	Johnson State College
Koliba	Christopher	University of Vermont, CDAE
Kujawa	Richard	Saint Michael's College

Manley	Pat	Middlebury College
Manley	Tom	Middlebury College
McCabe	Declan	Saint Michael's College
Rickets	Taylor	University of Vermont, Gund
Ross	Don	University of Vermont, Plant and Soil Science
Schroth	Andrew	University of Vermont, Geology
Sheldon	Sallie	Middlebury College
Stockwell	Jason	University of Vermont, RSENR
Troy	Austin	University of Vermont, Gund, RSENR
Van Houten	Judith	University of Vermont, Biology
Watzin	Mary	University of Vermont, RSENR
Wemple	Beverly	University of Vermont, Geography
Zia	Asim	University of Vermont, CDAE

It is important to note that we integrated social science into our research plans from the very beginning of our proposal development. It is critical for policy and management of the Lake Champlain Basin that our modeling and sensor networks provide information that will allow managers and governance bodies to test scenarios for future land and lake use to predict consequences in advance of actions.

We created a Center for Workforce Development and Diversity (CWDD) and located it at Saint Michael's College. Through CWDD we integrate paid undergraduate interns, teams of high school teachers and students, and middle school teachers into our research. We provide scholarships for Abenaki and first generation students. We are actively recruiting veterans and disabled students into our work. Mentoring is a critical aspect of our work with all of these groups.

To bring more diversity to our STEM participants than we might find in Vermont, we recruit students from Puerto Rico and high school teams from the Bronx, Poughkeepsie, and Puerto Rico to join us. Diversity of institutions is critical to our work, and we endeavor to integrate as many Vermont institutions of higher education, schools, and museums/aquaria as possible.

We support the Governor's Institutes of Vermont with scholarships for girls and economically disadvantaged students to make it possible for these high school students to participate.

Among our current researchers are 5 PhD graduate students and 4 postdocs. We assisted in the recruitment of three faculty into UVM: 2 in RSENR, Plant and Soil Science. We provide half to ¾ of the salary of these faculty members, and in two cases, all of the set up. We also recruited a Research Assistant Professor in Geology, and are supporting all of the salary. Mentoring all of these early career investigators is a critical part of our work.

Our television series in partnership with Vermont Public Television is in its 5th season. We feature cutting edge research in Vermont, including Environmental research.

2. *Strengths in the Context of UVM efforts*

Over the last three phases of VT EPSCoR we have supported research on the **environment**, especially on water in Lake Champlain and its watershed. We combined this research with modeling and especially **complex systems modeling**. We supported new faculty hires among other important contributions to the study of the environment at UVM and in the state: Research on Water in the Environment (2003-2007); Water Dynamics Workshop (2008); Complex Systems Modeling for Environmental Problem Solving (2007-2012); Adaptation to Climate Change in the Lake Champlain Basin: New Understanding through Complex Systems Modeling (2011-2016). Note that in the last 3 phases of VT EPSCoR we have strongly supported modeling and complex systems modeling even before there was a spike in Complex Systems. Our work in

the Lake Champlain Watershed is relevant to **Food Systems** through our study of land use and agricultural impacts on the lake and agricultural regulations and practices. We also are complementary to the **Neuroscience, Health and Behavior** spire in that we are working on the Lake and watershed governance, people's beliefs in climate change, and the impacts of the changing climate on agriculture in the Basin. We are working with the spire directors for Food Systems and NHB and the IGERT director to discuss the campus-wide needs for behavioral economists in our programs. We hope to coordinate our efforts to bring this expertise to UVM and our programs.

We have contributed to the recruitment and start up of careers of many faculty who study the environment. We have supported graduate students who have published papers in peer reviewed journals, won prestigious fellowship awards from the NSF and NIH, attended prestigious programs and workshops sponsored by the National Center for Atmospheric Research (NCAR), the Santa Fe Institute's Complex Systems Summer School program, contribute to the research and complete degree programs. We have built infrastructure from water flumes to 120 Gb fiber networks. These activities directly impact environmental research and education at UVM and certainly complement the efforts to build strength and expertise in the environment.

Very importantly, our research and our graduate/postdoc training are trans-disciplinary. In prior phases, we have had graduate students complete truly trans-disciplinary research projects. Our current students all have 2 advisors from two different disciplines; they are together in office space on the edge of campus and they meet with the faculty and postdocs who are drawn from multiple disciplines to work on each of three research questions.

3. Your program or unit in comparison to similar such offerings elsewhere in the US

We are extremely well regarded among the EPSCoR programs. We were forward funded for our current award, which is unusual and an indication of confidence by the NSF EPSCoR office in our program. Dr. Van Houten is the President of the Project Directors Executive Committee and has been invited to testify in front of congressional boards in Washington about the NSF EPSCoR program. Vermont EPSCoR received the New England Board of Higher Education "2012 New England Higher Education State Merit Award."

While we are unique in our focus on the Lake Champlain Basin, we share research interests with other EPSCoR states nearby (NH, ME) and at a distance (ID). We partner with investigators in these states to help develop critical mass, take advantage of resources, and produce synergies.

We are the lead state among 5 EPSCoR states that make up the North East Cyberinfrastructure Consortium. Together we built the first fiber network in the NE. We have gotten the attention of the White House and Congress for these efforts.

4. Your ideas for how this "Envisioning environment" process could help support your work and strengthen "Environment" as a core theme of UVM's mission

The committee's inventory of programs and entities that have environment at the core of their research or educational mission is very valuable. An inventory has been attempted before, but the resulting list of faculty who study the environment did not make much of an impact. We hope that this time the inventory will help to develop new interactions and collaborations that will bring value-added to UVM.

VT EPSCoR endeavors to be aligned with the initiatives and priorities of UVM, the state Science and Technology Plan, the state government's agencies efforts, and our Congressional delegation. We are charged with doing research and make broad impacts that are important to the economy of the state and region. The more we know about programs at UVM, the more we can partner with them and help to make connections within and outside UVM.

Whatever the outcomes there are from this committee's work, no one unit should own the term

“environment” on this campus. No single unit should house an Environment Institute if that comes to pass. We need to work cooperatively and with adequate resources so that programs and faculty who can potentially contribute are not shut out. I can’t think of a more inclusive term for this campus than “environment.” It encompasses social and natural science, engineering, medicine, social justice, the humanities, and more. It is the overarching theme of some liberal arts colleges for these reasons. The Lake Champlain Basin serves as a living lab space for the environment and around which diverse and multi-disciplinary teams can coalesce.

In recent years, the University has retreated from supporting efforts like VT EPSCoR, but if we are to build critical mass and capacity to do more important research on climate change and the environment, we need investments in people and facilities. Vermont is small enough to be a test bed for the rest of the country in studies of climate change. An NSF official in the Office of the Director called our Lake Champlain a “jewel” that should be the focus of research. Recognized as such, we were asked by NSF to lead a national water dynamics workshop in 2008 in which overarching themes such as Change Dynamics, Water Research Tools, Implications for Management and Social Impacts. The impacts from this workshop are still being realized today through collaborations that were initiated at the workshop. We at UVM should continue to build upon the extraordinary human and natural coupled systems of the Lake and watershed, as well as upon our existing strengths in environmental research. We should capitalize upon our position as the land grant university that should provide service to the state. Perhaps this Committee will articulate all of this.