

Project Summary

Overview: The State of Delaware, through its Science & Technology Council, has developed a strategic roadmap to guide the development and deployment of the State's science and technology assets, with the purpose of strengthening the competitiveness and improving the prosperity of the State. The roadmap is based on six strategic imperatives, one of which is to *"achieve a sustainable environment while ensuring a prosperous economy."* This is the focus of Delaware's second EPSCoR RII grant proposal, entitled *"Building Research and Education Infrastructure to Enhance Environmental Science and its Application in Delaware."* It is a logical extension of the first RII proposal and is fully supported by Delaware's Governor, who has requested \$5M in matching funds in her 2008 budget request to the Legislature. The proposal has four goals: (1) Grow the science and technology infrastructure of people, facilities and Discovery-based Research, that was begun under the first RII grant, with an increased emphasis on environmental science plus a cyberinfrastructure component; (2) Develop future scientists and technologists in increasing numbers and diversity, by building a demographically diverse, educational pipeline from middle school through post-graduate education; (3) Capture the educational, social and economic benefit of the Discovery-based Research by developing an integrative process to analyze and communicate the scientific, economic, ethical, social, political, regulatory, and legal implications of the research; and (4) Provide efficient and effective management and evaluation to reach project goals and on-time achieve sustainability for the new initiatives begun under this grant.

Intellectual Merit: The five-year goal of the Discovery-based Research program is to build a globally competitive capability in environmental research, education and outreach that will strengthen the State's capability to compete for and win large, multi-investigator center funding and contribute to the development of a productive pipeline of future scientists and technologists to ensure knowledge-based prosperity across the State. The research is focused on understanding the important biogeochemical processes that occur in the Critical Zone (CZ), the heterogeneous, near-surface environment that sustains life on the planet. The program, which integrates the capabilities of the partner institutions, has three research themes. The first is to better understand how microbe-metal-carbon interactions at CZ interfaces affect the uptake, cycling and transformation of contaminants. Answers to this question will enhance remediation efforts, improve water quality and mitigate algal blooms, fish kills and marshland decline. The second is to determine the mechanisms that control the formation, release, stability and transport of particles in the CZ and how particle interactions with contaminants and microbes impact biogeochemical processes. The output from this theme will enhance air and water quality. The third theme is to determine and deploy cyber-enabled technology that is needed to sense environmental events and processes. This will provide important monitoring and predictive capabilities to minimize catastrophic environmental events such as fish kills and algal blooms.

Broader Impact: The broadest impact of the grant will be to add to the knowledge base of environmental science and move Delaware towards a sustainable environment. Other impacts include the creation of a broad, state wide community of stakeholders, encompassing government, academia, private sector, and the public, including special interest groups, who understand, own, collaborate and support the effort towards ecosystem health. The efforts of the stakeholders will be aided by the establishment of a statewide *'Institute for the Environment'* that will integrate research, education and economic development opportunities. In addition, an institutionalized *'EPSCoR Integrative Process'* will be established to better understand and capture the educational, social and economic benefit from the research. The development of a demographically diverse, educational pipeline of well-trained scientists and technologists, will contribute significantly to the competitiveness and prosperity of the State.

Prospects for Success: The prospects for success are high. An experienced Management Team, the same responsible for the first RII grant, will manage this grant. The team has extensive experience in the public, private and academic sectors and a track record of successfully developing and managing large interdisciplinary grants. The Research program, which is aligned with the State's Science and Technology Roadmap, is led by a Faculty Leadership Team consisting of nationally recognized and distinguished faculty from the partner institutions, with extensive experience in leading major federal research programs, and an External Scientific Advisory Board comprised of representatives from academia, national laboratories, private industry and state government. An evaluation process with milestones and metrics has been established to assess progress toward grant objectives and make mid-course adjustments.