

External Advisory Board Review and Guidance
to
New Mexico EPSCoR RII3:
Climate Change Impacts on New Mexico's Mountain
Sources of Water

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Report: March 2010

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Introduction:

This is a report of the findings and recommendations of the External Advisory Board (EAB), convened by the New Mexico EPSCoR leadership on January 11-12, 2010. The EAB was asked to give advice, insight and guidance on the RII3, which just completed Year one of a five year program, identify opportunities and address challenges.

The overarching goal of the New Mexico EPSCoR RII3 is to enhance research competitiveness through the acquisition of critical climate change research infrastructure and cyberinfrastructure, and through strategic investment in human infrastructure. A second goal is to address a critical state problem of worldwide significance – understanding and forecasting the effects of climate change on water supply and sources in arid regions. The RII3 goals address two major issues critical to New Mexico's prosperity: (1) understanding climate changes that alter processes associated with water supply, critical to sustaining the economy and quality of life and (2) effectively engaging the diverse population (~ 40% Caucasian, 40% Hispanic and 20% Native American) in STEM career options.

Strengths:

The EAB strongly commends the leadership of the RII3 for their overall 5 year program plan and their progress in year one. The State EPSCoR Committee has identified a research and education focus area that is highly relevant to the State. The program has strong leadership. Dr. William Michener, Program Director, is doing an outstanding job in bringing diverse populations and institutions together to build critical bridges and attack tough issues necessary to accomplish the project goals and objectives. Dr. Mary Jo Daniel, the newly recruited Associate Director, has a strong science education background, which will contribute significantly to the education and diversity initiatives. The program appears to be well organized and has a good evaluation plan. Year one was strongly focused on putting the scientific measurement and monitoring instrumentation in place, including novel approaches such as distributed temperature sensing and isotopes, and has laid a good foundation for the five-year effort. The linkages between the measurement and monitoring programs, water management and the decision support system dramatically enhance the statewide program impact (e.g., the Tidwell climate, hydrologic, socioeconomic model). The strategic recruitment of undergraduates for the research internship program and the place-based, locally relevant outreach programs to Native Americans are very thoughtful and could serve as model systems for institutions. The program is strengthened significantly by a strong state competency in cyberinfrastructure and by bringing in a variety of external partnerships (e.g., the Nevada- Idaho-New Mexico cyberinfrastructure partnership, collaborations with the National Labs and outreach with the New Mexico Museum of Natural History and Science). The New Mexico EPSCoR RII3 is strongly positioned for success.

Challenges:

The major challenges to the program are largely those that are endemic to the State.

New Mexico is a very large state, and the program is distributed across a large geographical area. This makes interactions and communications an ongoing major issue. While the program is utilizing a number of current state-of-the-art communications technologies to overcome this issue, the leadership needs to be continually looking for additional ways to bring the geographically diverse community together. As part of the communication challenge, the EAB did not get a good sense of the program's scientific questions and research impacts. There appears to be a need to build a stronger research-based community and to clearly articulate the science questions and high level research impacts. Meetings at various field sites were discussed as one way to achieve community networking. The EAB was impressed with both the junior faculty mentoring and the "Innovation Working Group" initiative to promote team building and focus S&T development and urges RII3 leadership to expand these efforts.

New Mexico is ethnically one of the most diverse states in the country including a large Native American population (~20%). The State has a high level of poverty and low K-12 education achievement. This framework makes the education and outreach programs very ambitious and very challenging, but if successful they will have high impact. One of the several key challenges is to help Native American institutions develop better scientific laboratory infrastructure so that they can better prepare their students for future education opportunities. Only a small portion of the RII3 budget goes towards these efforts, hence leveraging with other Federal agency programs is essential to achieving this goal.

Recommendations:

The EAB offers the following recommendations:

- Increase communications both within the academic network and with the public. Internally, work with faculty to articulate the key science questions to be addressed by the EPSCoR sponsored scientific infrastructure. This will dramatically enhance faculty participation and buy-in, facilitate program integration and more clearly define future grant opportunities. Externally, clear articulation of the changing water dynamics on New Mexico and the impact on the entire population creates a compelling buy-in and support for the program (i.e., brand the program). Year one efforts lay the foundation for this effort.
- Consider addressing several of the EAB members' input on the science base of the program. These include: more closely link the data collection to the modeling analyses; consider including groundwater in the modeling studies (e.g. consider age dating ground water to provide an integrated estimate of recharge); clarify the fit of the proposed study to the statewide water plan in terms of current and future water supply and demand and investigate expanding the study boundaries to include Northeast New Mexico and beyond state boundaries.
- The diversity driven undergraduate research program and the Native American place based outreach program has tremendous potential. The programs would

benefit from better leveraging of science lab capabilities across institutions, from more involvement with tribal college leadership, and resource partnerships with other Native American/Minority based Federal Government programs.

- The RII3 is a very complex program that overlays a number of existing programs funded from a number of sources. As part of the evaluation of RII3, it will be important for the RII3 leadership to be able to articulate the contribution of EPSCoR versus the existing programs. EPSCoR has the opportunity to be a very significant integrating force on this collection of programs and by doing so can make a major contribution to understanding and adapting to Climate change in New Mexico.

Summary:

The EAB is very impressed with the year one progress of RII3. Much of the necessary baseline work in both physical and human infrastructure have been put in place and positions New Mexico EPSCoR well in both Climate Change adaptation and broadening STEM education and career opportunities for their diverse population.