A new $20 million Experimental Program to Stimulate Competitive Research (EPSCoR) grant from the National Science Foundation will support key research into ways to make New Mexico an energy sufficient state. The research will focus on ways to improve efficiency of sustainable energy resource utilization while minimizing water and environmental impacts. Participating institutions and partners include University of New Mexico, New Mexico State University, New Mexico Tech, New Mexico Water Resources Research Institute, Eastern New Mexico University, New Mexico Highlands University, Santa Fe Community College, New Mexico Museum of Natural History and Science, The National Museum of Nuclear Science and History, Explora Museum, Los Alamos National Laboratory, Sandia National...
Laboratories, Santa Fe Institute and the Global Center for Cultural Entrepreneurship.

William Michener, a professor with University Libraries at UNM, is the principal investigator along with UNM co-PI Mary Jo Daniel. Michener will coordinate research, education, and administration of the award. “The main idea of this award is to build our state research capacity to develop the state’s potential for sustainable energy development through collaborations among academia, business and industry and the National Labs,” Michener said.

“This new award builds on prior NM EPSCoR successes and will foster greater educational achievement in STEM fields and expand opportunities for employment in well-paid jobs for New Mexicans,” Daniel said.

The research will attempt to answer three main questions:

1. How can we sustain extractive energy development with no minimal risk to water and environmental resources?

2. How can the efficiency of resource utilization or extractive technologies be increased?

3. How can New Mexico realize its energy development potential in a sustainable manner?

Research teams will explore questions in several specific areas, many of them including water resource issues.

• Bioalgal Energy Development Team led by Peter Lammers, NMSU and David Hanson, UNM. This effort supports the next generation of biofuel production while making use of abundant solar energy in the Southwest as well as using produced and brackish groundwater for sustainable energy production in the desert where fresh water is limited.

• Social and Natural Science Nexus Team led by Sam Fernald, NMSU/ NM WRRI and Janie Chermak, UNM. This team will explore the sustainability of different energy technologies taking into account community economic choices and with particular attention to statewide water availability and interdependencies between water resources and energy sectors.

• Geothermal Energy Resources and Sustainability Team led by Mark Person, NM Tech and Laura Crosse, UNM. The geothermal energy team will develop a better understanding of factors that affect the viability and sustainability of New Mexico’s underlying natural hydrothermal systems.

• Osmotic Power Development Team led by Frank Huang, NM Tech and Bruce Thomson, UNM. Waters produced by oil and gas industries are the focus of this team that will confront issues related to membrane properties and fouling that prevent osmotic pressure systems from becoming commercially viable sources of power.

• Uranium Transport and Site Remediation Team led by Dana Ulmer-Scholle, NM Tech and Steve Cabaniss, UNM. Water quality is the water emphasis for this team that seeks to improve understanding of the way uranium moves in the environment and developing tools for predicting and controlling the movement.
• Solar Energy Development Team led by Michael Heagy, NM Tech and Marty Kirk, UNM. Including water in solar power processes, this team will explore solar-driven water oxidation that uses inexpensive catalysts to generate $H_2$, a clean high-energy fuel and will also explore more efficient photovoltaic cells.

Additionally, the award supports education and outreach activities that will build the human capacity needed to realize New Mexico’s potential in research, education and economic development.

These include:

• An after-school program for middle school students on computer modeling and simulation

• Summer research experiences for community college and tribal college students

• Professional development for community college faculty and for K-12 STEM teachers

• Museum exhibitions and a network of informal science education institutions

• An entrepreneurship institute to provide training in key enterprise functions to faculty

The research teams have already been designated and work began on the grant June 1, 2013. For more information, visit NM EPSCoR at http://nmepscor.org.

The Divining Rod will highlight each of the EPSCoR teams’ activities periodically (see pages 6 and 7).

New Mexico EPSCoR Vision

We envision New Mexico as a state that has achieved energy self-sufficiency in a sustainable manner through its research and development enterprise, that has a strong STEM pipeline between community colleges and the research universities, and that supports a culture of entrepreneurship that promotes innovation and new business and economic development.
TRANSFORMATIONAL SOLUTIONS FOR WATER IN THE WEST

September 5, 2013 • University of New Mexico Student Union Bldg, Albuquerque, New Mexico
In collaboration with the New Mexico Water Resources Research Institute

7:00 - 8:30 a.m.  Poster Mounting and Continental Breakfast

8:30 - 9:00 a.m.  Welcoming Remarks
  Marianne Walck or Jill Hruby, Sandia National Laboratories
  John Lyman, Director, Energy and Environment Program, Atlantic Council
  Sam Fernald, Director, New Mexico Water Resources Research Institute

  Moderator:
  Marianne Walck, Director, Geosciences, Climate and Consequence Effects Center & Deputy Director, Climate Security Program, Sandia National Laboratories

  Framing the Discussion:
  Howard Passell, Principal Member, Technical Staff, Sandia National Laboratories

9:00 - 12:45 p.m.  Session I: Transformational Solutions

  Urban Solutions
  Paradigm Shift: Rethinking Water Supplies in an Age of Scarcity
  John Entsminger, Senior Deputy General Manager, Southern Nevada Water Authority

  The Role of Potable Reuse as a Sustainable Water Supply Alternative
  Jeff Mosher, Executive Director, National Water Research Institute

  Integrated Water Management Strategies for the City of El Paso, Texas
  Hector Gonzalez, Government Affairs Manager, El Paso Water Utilities

  Water Resource Management in the 21st Century
  John Stomp, Chief Operating Officer, Albuquerque/Bernalillo County Water Utility Authority

  Governance Solutions
  The Train Wreck that Didn’t Happen, and You Never Heard About: The Anatomy of a Shortage Sharing Agreement on the San Juan River
  John Leeper, Professional Engineer, AMEC Environment and Infrastructure, Inc.

  Resilience in Water Governance: Building Adaptive Capacity within Socio-ecological Systems Facing Climate Change
  Melinda Benson et al., Assistant Professor, Department of Geology and Environmental Studies, University of New Mexico

This workshop will be held in Ballroom C of the Student Union Building at the University of New Mexico on September 5, 2013. Workshop space is limited. To RSVP, contact energy@acus.org or 202-701-7727.
Sustainable Water Management Profile
*Mike Myatt et al.*, California Water Foundation

The Traveler’s Dilemma: Logic and Illogic in New Mexico’s Water Laws
*Max Yeh*, Principal Researcher, Percha/Animas Watershed Association

Challenges, Constraints and Opportunities Associated with the Development of a Watershed-Based Stormwater Permit in the Middle Rio Grande, New Mexico
*Molly Blumhoefer et al.*, Geography Instructor, School of Math, Science and Engineering, Central New Mexico Community College

12:45 - 1:30 p.m.  **Lunch and Poster Session**

1:30 - 2:00 p.m.  **Keynote Speaker: Senator Tom Udall**
  Introduction: *Paul Hommert*, Director, Sandia National Laboratories

2:00 - 3:00 p.m.  **Session II: Transforming New Ideas into Policy: Challenges and Opportunities**
  Moderator: *Senator Tom Udall*

Strong Medicine: Considering a Greater Federal Role in Water Management
*Reed Benson*, Chair, Natural Resources Committee, University of New Mexico Law School

Where Will the Water Come From? Review of Water Availability in the West
*Vincent Tidwell et al.*, Distinguished Member, Technical Staff, Sandia National Laboratories

Water Resource Impacts Embedded in the Western U.S. Electrical Energy Trade; Current Patterns and Adaptation to Future Drought
*Benjamin Rudell*, Assistant Professor, CTI Department of Engineering & Senior Sustainability Scientist, GIOS, Arizona State University

Responding to Projected Water Resource Scarcity in the Upper Rio Grande Basin
*Jesse Roach*, Hydrologist, Earth Systems Analysis, Sandia National Laboratories

3:00 - 4:40 p.m.  **Session III: Transformational Solutions (continued)**

Management and Research Solutions

Water Transfers in the West: Projects, Trends, and Leading Practices in Voluntary Water Trading
*Carlee Brown*, Policy Associate, Western Governors’ Association

Responding to Projected Water Resource Scarcity in the Upper Rio Grande Basin
*Jesse Roach et al.*, Hydrologist, Earth Systems Analysis, Sandia National Laboratories

Transformational Management of Forest Ecosystems to Improve Water Availability and Ecological Resilience in the West
*Michael Hightower et al.*, Distinguished Member, Technical Staff, Sandia National Laboratories

Computational Model for Water Governance Reform
*Michael Agar*, Professor Emeritus, University of Maryland

Role of Research in Developing and Implementing Transformational Solutions for Water Sustainability
*Arnim Wiek et al.*, Associate Professor, Decision Center for a Desert City, Arizona State Univ.

4:40 - 5:15 p.m.  **Session IV: Summary Discussion/Next Steps**

5:15 - 5:30 p.m.  **Closing Remarks**
Bioalgal Energy Development

By Hamid Mansouri Rad, Office of Research Development, NMSU

Having a better understanding about algal biology and how to scale up algal biofuels production from cells and populations to large reactors will help grow the bio-algae industry that has recently begun in the desert Southwest. The EPSCoR Bioalgal Energy Team includes researchers from Eastern New Mexico University, New Mexico State University, the University of New Mexico. They will investigate three overarching questions:

1. Can inexpensive, scalable, closed bioreactor designs maximize biomass productivities with heat tolerant algae in summer and cold-tolerant strains in winter with minimal water consumption and cultivation costs while achieving a net positive energy balance?

2. What species/community characteristics and cultivation conditions best promote stable, reproducible, large-scale production of algal biomass and also harmonize with design specifications for algal cultivation; extraction and conversion processes for high-, mid-, and low-value products; and QA/QC specifications for fuels and co-products?

3. Can wastewater sources safely offset nutrient requirements at large scales, and how do associated scale-up logistics, reactor design and operation affect output water quality to meet process recycling and discharge requirements?

A key consideration for algae cultivation at large scales is the scarcity of water in New Mexico. However, the team has been successful in taking advantage of non-potable brackish water, which is not suitable for municipal or agricultural uses without desalination. The team will examine techno-economic synergies between energy-positive, wastewater treatment using water-efficient algal cultivation systems and the emerging algal-biofuel industry in the desert Southwest. Development of energy-positive treatment processes that utilize dairy wastewater and municipal wastewater are priorities for the program. The team will face challenges in developing efficient integrated processes that conserve nutrients and water resources to enhance competitiveness of New Mexico agriculture.

One of the goals of this project is to reduce the environmental impact of the future algal biofuels industry in New Mexico. “The NM EPSCoR award has provided us with a significant opportunity” says NMSU Team Co-Leader Peter Lammers. “We are looking closely at every step in this process, from algae cultivation, and CO₂ supply, to algal oil extraction, and fuel conversion; all with an eye toward optimizing yields and utilizing wastes. By returning derivates to the algae production cycle and avoiding waste generation, we will have a minimal environmental footprint.”

The innovative technologies that result from NM EPSCoR investments and research should help overcome the challenges of developing algal biomass in a desert environment where fresh water is precious. The goal is to make the use of algal biomass a sustainable, economically viable component of a renewable energy portfolio in New Mexico.

In addition to building new facilities for growing and processing algae, the team will collaborate with industry and national laboratories to provide interdisciplinary training for undergraduate and graduate students so they can continue and expand this research field.

NMSU students in the greenhouse conducting algae research. (Photo courtesy of Wiebke Boeing)
Social and Natural Science Nexus

By Hamid Mansouri Rad, Office of Research Development, NMSU

New Mexico EPSCoR’s Social and Natural Science Nexus team goals are to better understand the trade-offs that occur between different energy and economic development choices while considering the potential for sustainable socioeconomics, environment, and water use.

This project is co-led by Sam Fernald, Director of the NM WRRI, who is also an NMSU professor of watershed management in the Department of Animal and Range Sciences and also by Janie Chermak, department chair and professor of natural resource economics at UNM. The team also includes NMSU’s Steve Guldan, Thomas Schmugge, Caitriana Steele, and Ursula Smedly. New Mexico Tech is represented by Mike Pullin, UNM by Jennifer Thacher and Bruce Thomson, Vince Tidwell from Sandia National Laboratories, and Bob Parmenter, from the Valles Caldera National Preserve.

One major goal is to construct a dynamic statewide water budget based on hydrologic science. Fernald points out, “We have access to information about water usage across the state, but that information is static. In reality, water usage is dynamic and constantly changing. In this project, we are going to obtain information about the water budget, both physical and hydrological, and our model is going to simulate different scenarios regarding water use in various temperatures, including during drought.” The plan is to make the statewide water budget available to researchers to support water research above and beyond EPSCoR efforts. The statewide water budget will kick off with an innovation working group in fall 2013 to bring in experts in regional hydrologic assessments including top New Mexico water managers. In a hydrology roundtable, the group will extract lessons learned from other large-scale water assessments to help kick-start this effort.

Another major product of the Social and Natural Science Nexus team is a cutting-edge multidisciplinary model that links natural and human systems, which will be used to develop a decision-support tool for energy development in New Mexico.

The team will use system dynamics modeling to simulate the links between energy, water, built infrastructure, environment, and human perceptions. This team will integrate results from energy sector studies throughout the broader EPSCoR project.
Reports and Links Available

USGS


Stay Current on Your Rivers with USGS WaterNow http://water.usgs.gov/waternow/


Bureau of Reclamation
Major supply shortages loom in 7-state basin http://www.usbr.gov/lc/region/programs/crbstudy/finalreport/index.html

Rio Grande Compact Commission
2011 Report of the Rio Grande Compact Commission to the Governors of Colorado, New Mexico and Texas was released in late February 2013. The report is available on the Office of the State Engineer website at: http://www.ose.state.nm.us/isc_rio_grande_tech_compact_reports.html

Upcoming 2013 Conferences

September 5, 2013 Transformational Solutions for Water in the West, workshop sponsored by Sandia National Laboratories and the Atlantic Council of the United States and co-sponsored by NM WRRI, Sandia National Laboratories, Albuquerque, NM energy@acus.org


October 23-24 24th Annual South Platte Forum, The Ins and Outs of the South Platte Basin, Longmont Plaza Hotel, CO www.southplatteforum.org

November 4-7 AWRA Annual Water Resources Conference, Red Lion Hotel on the River-Jantzen Beach, Portland, OR http://www.awra.org/meetings/Portland2013


NM WRRI’s 57th Annual New Mexico Water Conference

Poster Abstracts Due
October 4, 2013

http://2013.wrri.nmsu.edu
Albert E. Utton Memorial Water Lecture

featuring

Tanya Trujillo

Executive Director, Colorado River Board of California, formerly with the
New Mexico Interstate Stream Commission

November 21, 2013 12:00 – 1:45 p.m.
58th Annual New Mexico Water Conference
Embassy Suites Albuquerque

The Albert E. Utton Memorial Water Lecture honors the memory of a lifelong friend of the New Mexico Water Community. Al Utton served New Mexico for over 35 years as a distinguished member of the University of New Mexico School of Law, a twenty-year member of the New Mexico Interstate Stream Commission, a valued advisor to the New Mexico Water Resources Research Institute, a worldwide authority on transboundary issues, and a recognized leader in conflict resolution.

Tanya Trujillo is the sixth recipient of the Albert E. Utton Memorial Water Lecture. Previous honorees include Dan Tarlock, Mexico Ambassador Albert Székely, Charles DuMars, Em Hall, John Hernandez, and Joe Stell.

Colorado River Basin focus of Utton Lecture

Register at: http://2013/wrri.nmsu.edu/

Colorado River photo courtesy of Benjamin Edelstein
Preliminary Program
Thursday Morning, November 21, 2013

8:30  Welcome
Sam Fernald, NM WRRI Director

8:45  Opening Address
Lowell Catlett, New Mexico State University

9:15  Setting the Stage
John Shomaker, John Shomaker and Associates, Inc.

9:30  Changing Precipitation, Temperature, and Stream Flow Conditions
Dave Dubois, New Mexico State Climatologist
Greg Pederson, U.S. Geological Survey, Northern Rocky Mountain Science Center

10:30  Break

10:45  Western Perspectives
Water Transfers in the West, Tony Willardson, Western States Water Council
The Importance of Agriculture, Dan Keppen, Family Farm Alliance

11:35  New Mexico State Engineer Update, Scott Verhines

12:00  Luncheon
2013 Albert E. Utton Memorial Water Lecture
Collaborative Efforts in the Colorado River Basin
Tanya Trujillo, Colorado River Board of California
Thursday Afternoon

1:30 Legal Realities and Solutions
    Health of Settlements, Steven L. Hernandez, P.C.
    Priority Administration, Dudley Jones, Carlsbad Irrigation District
    Is Prior Appropriation Dead? Em Hall, University of New Mexico School of Law

2:30 Forgotten Rivers
    Clean and Healthy Rivers, Chris Canavan, NM Environment Department
    Healthy Watersheds and Water Quality, Steve Wilmeth, Doña Ana County Soil and Water
    Riparian Areas, Steve Harris, Rio Grande Restoration

3:30 Break

3:45 Stakeholders Panel: Proposals for Meaningful Change moderated by Jose Rivera, UNM
    Frank Chaves, Sandia Pueblo
    Juan Garcia, El Rito Regional Water and Wastewater Association
    Dan Guevara, NM Environment Department
    Steve Guldan, NMSU Sustainable Agriculture Center, Alcalde
    Matt Holmes, NM Rural Water Association

Friday Morning, November 22, 2013

8:15 Legislative Perspectives, introduced and moderated by John Fleck, Albuquerque Journal
    Federal View, Kris Polly, editor-in-chief, Irrigation Leader
    State View, NM Senator Peter Wirth, NM Senator Joseph Cervantes, (invited)
    NM Senator Steven Neville, and NM Representative Don Tripp

10:00 Break and Poster Viewing

10:45 Economic Impact of New Water Realities
    The Relationship Between Energy and Water, Scott Backhaus, Los Alamos National Laboratory
    Economic Impact of Western Agriculture: Focus on New Mexico, Darryll Olsen, Washington State

11:25 Urban Solutions, the El Paso Example, John Balliew, El Paso Water Utilities

11:45 Conjunctive Use of Surface and Groundwater on the Pecos, Greg Lewis, NM Interstate Stream Commission, Pecos River Basin


12:30 Water Data on the Web
    David R. Maidment, University of Texas at Austin

1:00 Luncheon
    Reflections from Water Careers in the Ivory Tower
    Retiring faculty Bruce Thomson, University of New Mexico
    and Adrian Hanson, New Mexico State University
NM WRRI 58th Annual New Mexico Water Conference
New Water Realities: Proposals for Meaningful Change

Call for POSTER ABSTRACTS

Deadline for Poster Abstracts
October 4, 2013

Poster Abstract Guidelines
Poster abstracts should not exceed 250 words and must be submitted online. Posters must be mounted on a hard poster backing appropriate for use with an easel, which will be provided. Abstracts will be reviewed by a committee and a notice of poster acceptance will be emailed by October 11.

Poster abstract guidelines are online at http://2013.wrri.nmsu.edu/posters

Registration
All poster presenters must register for the conference. The registration fee will be waived for students who present a poster.

Registration online at http://2013.wrri.nmsu.edu/

The 58th Annual New Mexico Water Conference has been approved for 9.0 credits by the New Mexico Minimum Continuing Legal Education Board.