

○ — SCIENCE



a world where science solves hunger, where data helps shape communities and policy, where educators are given free tools to impart conscious living...

# Imagine That

ANNUAL REPORT 2012

ENVIRONMENT — ○



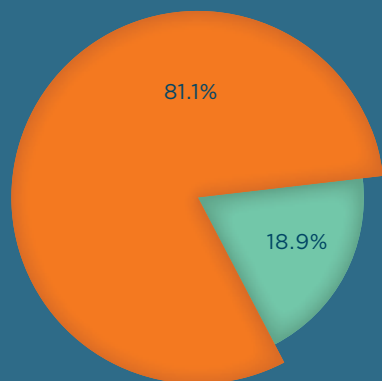
○ — SOLUTIONS

# Financial Report

FISCAL YEAR 2012

## Sponsored Research Project Funding Sources

TOTAL \$33,490,100



**Federal** \$27,169,118

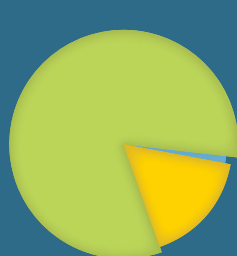
- Dept. of Energy 17.5%
- Dept. of Defense 17.5%
- NOAA 13.5%
- NSF 10.9%
- EPA 7.6%
- NASA 5.7%
- Dept. of Interior 4.9%
- Other 3.5%

**Non-Federal** \$6,320,982

- Private 9.1%
- NFP/Muni./Dist. 5%
- Local Govt. 2.8%
- Foreign 1.8%
- Other 0.2%

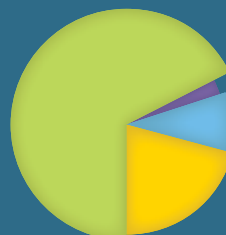
## For the Institute

**TOTAL REVENUE**  
\$50,160,000



- Grants & Contracts** \$41,272,000
  - Federal \$27,666,000
  - Service Contracts \$10,838,000
  - Private \$1,882,000
  - State & Local \$398,000
  - Other Revenue \$488,000
- State Appropriations** \$8,416,000
  - State General Fund \$7,421,393
  - Other Appropriations \$994,934
- Other Resources** \$472,000

**TOTAL OPERATING EXPENSES**  
\$49,425,000



- Employee Compensation & Benefits** \$33,416,000
- Supplies & Services** \$10,377,000
- Depreciation** \$4,525,000
- Utilities** \$1,107,000

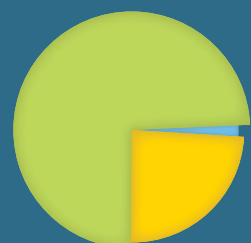
**TOTAL NET ASSETS**  
\$114,162,000

**TOTAL ASSETS**  
\$133,462,000

**TOTAL LIABILITIES**  
\$19,300,000

## For the Foundation

**TOTAL REVENUE** \$999,000



- Gifts, Contributions & Events** \$729,000
- DRI Support** \$222,000
- Other Revenue** \$48,000

**TOTAL OPERATING EXPENSES** \$943,000



- Gifts to DRI** \$525,000
- Contributed Salaries & Wages** \$217,000
- Supplies & Services** \$201,000

# Innovation Based Economic Development



## Bridging The Gap Between World-Class Environmental Research, Higher Education and Industry Needs to Assist Nevada's Plan for Excellence in Economic Development

DRI scientists are using IBM's PureSystems family of expert integrated computer systems to analyze, visualize and model environmental data. This unique collaboration will improve DRI's scientific research capabilities in fields ranging from hydrology and water efficiency to atmospheric physics, archaeology and renewable energy. DRI, the Nevada Governor's Office of Economic Development (GOED) and the Nevada Department of Employment, Training and Rehabilitation (DETR) are utilizing IBM PureSystems as the platform of choice for the state's strategy for transformative innovation through higher education and a Center of Excellence based in Las Vegas.



Nevada Governor's Office of  
ECONOMIC DEVELOPMENT



### Project Milestones:

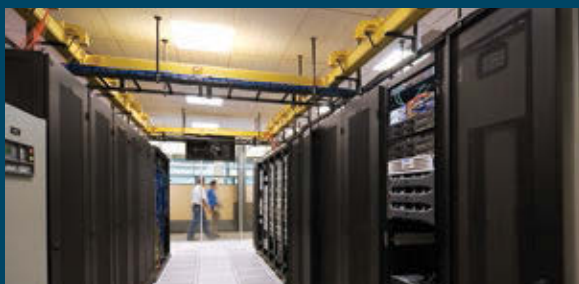
- Aug. 2012 - IBM reviews DRI's advanced visualization and data engineering capabilities.
- Nov. - Dec. 2012 - DRI faculty evaluate IBM PureSystems family of expert integrated systems.
- Dec. 2012 - Governor Brian Sandoval requests DRI and GOED develop a concept for shared investment and use of IBM's advanced technology for economic development.
- Jan. 2013 -
  - GOED Board of Directors approves Center of Excellence concept.
  - NSHE (DRI), GOED and DETR execute lease/purchase agreement for IBM PureSystems.
- March 2013 - Nevada Board of Examiners approves \$3.8 million in funding contracts to support the Nevada Center of Excellence.



Learn more about the Nevada Center of Excellence at [www.dri.edu/coe](http://www.dri.edu/coe)



*DRIVE 6 - DRI Virtual Environment immersive virtual reality enclosure. Reno Gazette-Journal, Andy Barron*



*DRI's advanced data center.*

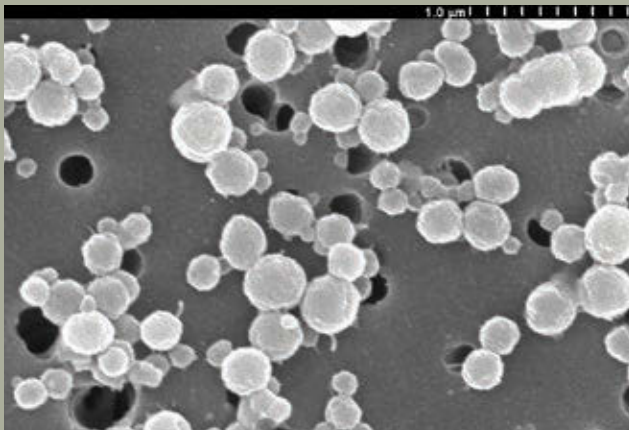
## Visualization, Big Data Analytics and Cyber-Engineering Take Center Stage

DRI's Center for Advanced Visualization, Computation, and Modeling (CAVCaM) is evolving to promote a service-oriented business model with capabilities to support business, industry and local agencies with contract-based advanced data analysis, simulation, 3D virtual engineering, real-time analytics and more. This new concept is modeled on the principles of the successful German Fraunhofer Institutes.

In November 2012, the City of Reno was selected as one of only 100 cities globally to receive a prestigious IBM Smarter Cities Challenge grant. As part of Reno's Smarter Cities Challenge project, IBM experts identified a roadmap to creating a new system-of-systems data-analytics utility that will serve the region and facilitate economic development. Based on its expertise with data analysis and engineering, DRI was recognized as the appropriate technical resource to assist with creating the shared data platform and will be collaborating with the Truckee Meadows Regional Planning Agency and the City of Reno in the next steps of the project.



Watch a video showcasing DRI's CAVCaM Facility at [www.dri.edu/cavcam](http://www.dri.edu/cavcam)



Scanning electron micrograph indicates very small and numerous (~0.2 micron) bacterial cells inhabiting icy brine channels in Antarctica's Lake Vida. Photo by Christian H. Fritsen and Clinton Davis.

## Antarctica's Ancient Extremophiles

EXAMINING MICROBIAL LIFE IN ONE OF EARTH'S COLDEST, DARKEST, MOST UNIQUE ECOSYSTEMS

In November, DRI researchers Alison Murray, Ph.D., and Christian Fritsen, Ph.D., co-authored a pioneering study published in the Proceedings of the National Academy of Sciences that revealed, for the first time, a viable community of bacteria that survives in a dark, salty and subfreezing environment beneath nearly 20 meters of ice in one of Antarctica's most isolated lakes. The announcement was covered by more than 250 media outlets around the world and featured on NPR's Talk of the Nation Science Friday and BBC News America.



Listen to the Science Friday interview and explore Lake Vida online at [www.dri.edu/lake-vida](http://www.dri.edu/lake-vida)

## DRI Invests \$1.6 million

annually in non-state dollars to support graduate student work at UNR & UNLV

## Unmanned Aerial Vehicles Detect Cloud Pollution, Climate Change

In March, Eric Wilcox, Ph.D., and graduate student Nic Beres participated in the Cloud Aerosol Radiative Forcing Dynamics Experiment (CARDEX) in the Republic of the Maldives. Led by the Scripps Institute of Oceanography, research teams used unmanned aerial vehicles (UAVs) in the lowest elevation country on Earth to see how pollution affects the brightness of clouds, which in turn has a cooling effect on the climate. DRI's Hans Moosmüller, Ph.D., helped develop and patent one of the instruments used in the project.



UAVs were used to detect pollution particles and cloud structure and dynamics.

DRI was created by the Nevada Legislature in

# 1959

to conduct and promote fundamental & applied research



Learn more about DRI's history at [www.dri.edu/about-dri](http://www.dri.edu/about-dri)



## Black Carbon Aerosols Causing Warmer Temperatures in India

Research published in Geophysical Research Letters by Rajan K. Chakrabarty, Ph.D., Mark A. Garro, Ph.D., Eric M. Wilcox, Ph.D. and Hans Moosmüller, Ph.D. revealed that the Brahmaputra River Valley region of India contains some of the highest levels of black carbon (BC) aerosols in the world. Their findings, supported by a NASA research grant, calculated that, on average, this high level of pollutants has given rise to a daily temperature increase of two degrees Celsius in the region.

## DRI Secures \$35.9 Million to Continue Work for Department of Energy

In 2012, DRI secured a Technical Research, Engineering, and Development Services contract, building on more than 40 years of environmental monitoring, restoration and support of the nationally important missions of the U.S. Department of Energy, National Nuclear Security Administration. The contract extends until October 31, 2016 and has a ceiling value

of \$35,926,593. This is an umbrella contract through which DRI is able to negotiate and compete for work each federal fiscal year. The amount ultimately awarded depends on the hard work of DRI researchers and particularly the efforts of major project managers, Colleen Beck, Ted Hartwell, Julie Miller, Jenny Chapman and Chuck Russell.



# Environment

## A Life Underground

UNDERSTANDING THE POTENTIAL FOR SUBSURFACE MICROBIAL LIFE ON EARTH... AND BEYOND

In September, the NASA Astrobiology Institute funded a five-year, \$6 million study seeking to understand how life begins and evolves; if there is life beyond Earth; and if so, how it can be detected.

Duane Moser, Ph.D., a co-investigator on the interdisciplinary "Life UnderGround" team led by USC and consisting of more than 20 scientists from around the world, is coordinating the land-based field work below the Earth's surface in extreme environments such as Death Valley and the Nevada Test Site.



Read more about Moser's discovery of a microbe known as *Candidatus Desulforudis Audaxviator*, or "bold traveller," in a New Scientist article at [www.dri.edu/news](http://www.dri.edu/news)



*DRI's Duane Moser, Ph.D., investigates extreme life 4,850 feet underground at the Sanford Underground Research Facility (SURF) in Lead, South Dakota.*



## Guiding NASA's Landsat Mission

In October, the U.S. Geological Survey (USGS) named Justin Huntington, Ph.D., to the National Science Team supporting the new Landsat Data Continuity Mission Satellite, launched in February 2013 from Vandenberg Air Force Base in California. Huntington and fellow DRI staff, remote sensing and GIS scientists Charles Morton, Tim Minor and Matt Bromley, were awarded \$300,000 over five years to provide technical and scientific input to USGS and NASA on water issues critical to the success of the Landsat program, and to focus on developing and enhancing field scale Landsat derived water use maps and surface energy balance products.

## A Legacy of Enhancing Snowfall

Last year, DRI's cloud seeding program received a three-year, \$1.3 million funding commitment from the Southern Nevada Water Authority, and named Jeff Tilley, Ph.D., its new Director of Weather Modification. Tilley succeeds Arlen Huggins, who oversaw the program for nearly two decades and expertly applied the technique of using trace chemical analysis of snowfall to assess both environmental impacts and the effectiveness of cloud seeding. The program also received funding commitments in 2012 from the Truckee Meadows Water Authority, the Western Regional Water Commission and the U.S. Bureau of Reclamation.



Learn more about DRI's cloud seeding work at [www.dri.edu/cloudseeding](http://www.dri.edu/cloudseeding)



*DRI scientists estimate that annual augmented snow water has averaged 64,000 acre-feet during the last 15 years. That's about 21 billion gallons, or enough to supply 64,000 four-person households for a year.*

## Caesars Foundation Establishes Fellowship for Watershed Research

DRI collaborated with the Caesars Foundation in 2012 to create the Caesars Foundation Fellowship in Watersheds and Environmental Sustainability, a three-year funding mechanism and extensive research opportunity focused on the Lake Tahoe basin. The Fellowship was awarded to Ms. Angela Stevens, a graduate research assistant at DRI and a student in the University of Nevada, Reno's Hydrology Program. The award will provide \$48,750 in funding, matched by DRI's Division of Hydrologic Sciences.



Learn more about DRI's work in Lake Tahoe at [www.dri.edu/lake-tahoe-watershed](http://www.dri.edu/lake-tahoe-watershed)

# Solutions



## The Future of Agriculture in Nevada

AGRICULTURE RESEARCH AND NEVADA MEDALIST HIGHLIGHT UNIQUE POSSIBILITIES FOR SUSTAINABLE FOOD PRODUCTION IN ARID REGIONS

As Nevada looks to new industries, indoor agriculture has become increasingly popular. Local and international companies are turning to DRI for support evaluating and innovating research and technologies in hydroponic, aeroponic and aquaponic growing.

- The 2013 Nevada Medal proudly honored Nina V. Fedoroff, Ph.D., a leading geneticist, molecular biologist and Distinguished Professor of Biosciences and Director of the Center for Desert Agriculture at the King Abdullah University of Science and Technology (KAUST) in Saudi Arabia, where she is establishing an experimental program in crop and aquaculture biology and technology for arid climates.
- DRI associate research professor, Navin Twarakavi, is evaluating a privately developed leaf sensor for its economic viability for commercial and residential irrigation in urban areas of the Southwest United States.
- DRI has assisted the Nevada Governor's Office of Economic Development with the introduction of international agriculture technology companies, specializing in innovative farming techniques, to research and development opportunities in Las Vegas.



## Sustainable Water, Sanitation and Hygiene Solutions

In 2012, DRI selected Braimah Apambire, Ph.D., as the new Senior Assistant to the President for Global Sustainability and Director for Water, Sanitation and Hygiene (WASH) programs. His work will help examine the sustainable use of water resources and build capacity in the developing world. This opportunity was made possible through a generous \$500,000, three-year grant from the Conrad N. Hilton Foundation.



Watch a video on DRI's Water, Sanitation and Hygiene work at [www.dri.edu/tv](http://www.dri.edu/tv)



*DRI helps locate and assess the water quality of community wells like this one in Northern Ghana.*



*This parking lot array, completed in 2012, provides nearly 60% of DRI's electrical capacity needed to power DRI's Southern Nevada Science Center.*

## DRI Foundation Forum Focuses on Energy Future

More than 75 representatives from every sector of Nevada's energy industry gathered at DRI's Reno campus in October to discuss energy challenges facing the Silver State, opportunities available and actions needed to lead the West and the nation in renewable energy generation, transmission and delivery. The event projected a theme present throughout the day's panel discussions, touting Nevada's abundance of renewable energy resources and calling for much stronger collaboration among industry, education and government.



Flip through presentation slides from the Energy Forum online at [www.dri.edu/foundation-forums](http://www.dri.edu/foundation-forums)

## Developing a Plan to Reduce Energy Costs

In January, USDA Rural Development awarded \$99,935 to DRI's Renewable Energy Research Group to conduct energy audits for small, rural businesses and agricultural producers in Northwestern Nevada and Northeastern California. The energy audit program, led by DRI's Curtis Robbins and a first of its kind in Nevada, is providing businesses, ranchers and farmers with a way to identify their baseline energy use and develop a plan to reduce energy costs.



Learn more online at [www.dri.edu/energy-assessments](http://www.dri.edu/energy-assessments)



# Education & Outreach



Students, teachers and community volunteers planted native, edible gardens during National Green Apple Day of Service in 2012. A program presented by the U.S. Green Building Council and GreenPower.

## Helping Nevada's Kids Grow Up Green

ENERGIZING NEW LEADERSHIP AND OPPORTUNITIES FOR DRI'S GREENPOWER PROGRAM

This year marked an incredible stride for GreenPower. After naming Amelia Gulling the program's new administrator, the GreenBox Initiative (created by Fayth Ross) was revitalized and new curriculum and hands-on activities were developed. More than 350 Nevada educators attended various GreenPower teacher trainings across the state. In addition, ongoing commitments from NV Energy and other supporters have raised more than a quarter of a million dollars to ensure the program's success far into the future.



Learn more at [www.dri.edu/greenpower](http://www.dri.edu/greenpower)



Follow GreenPower at [facebook.com/drigrainpower](https://facebook.com/drigrainpower)



DRI's GreenPower Program is present in more than 130 of Nevada's K-12 schools. GreenPower's free teacher trainings focus on STEM education and more.

## The Next Generation of Great Scientists

For higher education students, DRI provides a learning environment strongly focused on collaborative, interdisciplinary research, led by Christian Fritsen, Ph.D., DRI's Interim Vice President for Academic Affairs. Faculty members participate in Atmospheric and Hydrologic Science academic programs with the University of Nevada, Reno, University of Nevada, Las Vegas and Nevada State College. Students conduct their research at DRI while earning their degrees through the universities.

DRI is also committed to Nevada's K-12 education system and the professional development of its teachers. GreenPower and other outreach programs emphasize "teaching the teachers" so they can bring real world knowledge back into their classrooms.



Find out more about DRI's graduate programs and K-12 outreach online at [www.dri.edu/education-and-outreach](http://www.dri.edu/education-and-outreach)



Photo courtesy of Reno Gazette-Journal, Tim Dunn

## Making an International Impact

At any given time DRI has more than 300 research projects occurring on every continent around the globe with numerous international research institutions and industry partners. In September, DRI renewed one such partnership with the Chinese Academy of Science's Institute of Earth Environment (IEECAS) in Xi'an, during Governor Brian Sandoval's Trade Mission to China and South Korea. DRI and Chinese scientists have undertaken collaborative work examining long-term evidence of pollution and climate change in Tibetan glaciers and examined methods of preservation necessary to maintain the 2,200 year-old remnants of China's Terra Cotta Army.



Watch the unveiling of an ancient Terra Cotta Warrior replica, donated by the Tom & Mary Kay Gallagher Foundation, on DRI's Reno Campus online at [www.dri.edu/tv](http://www.dri.edu/tv)



Follow @DRIScience on Twitter



Like us on Facebook



Watch and learn on DRI's Youtube Channel



View GreenPower's boards on Pinterest

# Putting Imagination to Work



Completed in 2008, DRI's Computational Research and Visualization Building in Reno houses the Center for Advanced Visualization, Computing and Modeling, and was awarded a LEED Gold Certification from the U.S. Green Building Council.

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