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New Project Aims to Make New York's Lake George the "Smartest Lake" in the World

Planned World-Class Environmental Laboratory with Monitoring and Prediction System to Be Cornerstone of Rensselaer Polytechnic Institute, IBM, and the FUND for Lake George Collaboration

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June 27, 2013

Rensselaer Polytechnic Institute, IBM, and the FUND for Lake George today announced the launch of "The Jefferson Project at Lake George," a three-year, multi-million dollar collaboration with the goal of understanding and managing complex factors—including road salt, storm water runoff and invasive species—threatening one of the world's most pristine natural ecosystems and an economic cornerstone of the New York tourism industry. The collaboration partners expect that this world-class scientific and technology facility at Lake George will create a new model for predictive preservation and remediation of critical natural systems on Lake George, in New York, and ultimately around the world.

The Jefferson Project, an homage to President Thomas Jefferson's declaration of Lake George as "without comparison, the most beautiful water I ever saw," aims to establish one of the world's most sophisticated lake environmental monitoring and prediction systems giving scientists and the community a real-time picture of the health of the lake. Lake George is a headwater lake, meaning it



YouTube video



IBM Research Scientist Harry Kolar (right), Sandra Nierzwicki-Bauer of the RPI Darrin Fresh Water Institute (center) and Eric Siy from The FUND to Save Lake George scout locations for new sensors which will be part of a three-year, multi-million dollar collaboration between the partners to make Lake George the world's "smartest" lake, on Thursday, June 27, 2013, Bolton Landing, NY. The project will help researchers

has limited external influences on water quality which contributes to its New York State water quality rating of Class AA-Special. Lake George is an ideal body of water to study due to its size and unique ecosystem. Approximately 95 percent of the land surrounding Lake George remains as natural forestland, 46 percent of which is "forever wild" state-owned forest preserve.

Scientists from Rensselaer have been studying the Lake for 30 years and have noted the emergence of environmental stressors that include rising levels of chlorophyll that threatens water clarity and a threefold increase in salt levels primarily due to road salt applied to roads in the watershed. Lake George tourism alone accounts for an estimated \$450 million of economic activity in Warren County and approximately \$1 billion in the surrounding region. The long-term health of the Lake is critical to the region and New York State's tourism industry.

The collaboration partners plan to use a combination of advanced data analytics, computing and data visualization techniques, new scientific and experimental methods, 3-D computer modeling and simulation, and historical data expecting to gain an unprecedented scientific understanding of Lake George. Also central to the project will be weather modeling and sensor technology similar to those used by IBM around the world at locations including Rio de Janeiro, Ireland's Galway Bay, and New York's Hudson River. The combination of these unique predictive capabilities will enable scientists and the community to prioritize and act before permanent degradation can take place.

For example, the new monitoring system is expected to give scientists a view for the first time of circulation models in Lake George. These 3-D models could then be used to understand how currents distribute nutrients and contaminants across the 32-mile lake and their correlation to specific stressors. These models could be overlaid with historical and real-time weather data to see the impact of weather and tributary flooding on circulation patterns in Lake George.

IBM plans to provide hardware, software, and supporting services to help create a new, Smarter Water laboratory and visualization studio at Rensselaer's Margaret A. and David M. Darrin `40 Fresh Water Institute on Lake George. A team of IBM Smarter Water experts, in partnership Rensselaer and the FUND for Lake George, plan to pair their expertise with this new technology to help local leaders see a real-time picture of the current and future computer modeled conditions, water chemistry, and health of the natural systems. Local groups could use this data to make informed decisions on the protection of Lake George's pristine waters and unique ecosystem.

understand how to manage complex factors — including road salt, storm water runoff and invasive species — which are threatening Lake George, one of the world's most pristine natural ecosystems and an economic cornerstone of the New York State tourism industry. (Erin Reid Coker/Feature Photo Service for IBM)



Pdf available at <http://tinyurl.com/nw212o8>

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Expanding the Range of

"Lake George has a lot to teach us, if we look closely," said [Rensselaer President Shirley Ann Jackson](#). "By expanding Rensselaer's Darrin Fresh Water Institute with this remarkable new cyberphysical platform of data from sensors and other sources, and with advanced analytics, high performance computing, and web science, we are taking an important step to protect the timeless beauty of Lake George, and we are creating a global model for environmental research and protection of water resources."

"Through the Jefferson Project, Rensselaer, the FUND for Lake George, and IBM will help advance the state of the science and the practice of water management to create a more precise, actionable and sustainable model that will give us a path forward" said John E. Kelly III, senior vice president and director of IBM Research.

"The still pure water of Lake George is the lifeblood of our economy, but it will take unprecedented commitment to keep it that way," said Jeffrey M. Killeen, board chairman of the FUND for Lake George. "By shining the light of science on the future of Lake George, this bold collaboration will empower our ability to succeed. It is an historic opportunity to demonstrate just what it will take to protect a priceless natural treasure for future generations. The FUND for Lake George is honored to be playing a role in this vital pursuit."

Lake George, about 50 miles north of Albany in upstate New York, is known internationally for its crystal-clear waters with a depth of up to 200 feet. Rich in natural and cultural history, it is 32 miles long and up to 2.5 miles wide, formed nearly 10,000 years ago by melting glaciers.

In collaboration with the FUND, the Darrin Fresh Water Institute has built a comprehensive 30-year database of lake conditions which when paired with new sensor acquired data, advanced analytics, computing, and data visualization technologies, will enable Jefferson Project researchers plan to investigate and address key questions including:

- What was the pristine state of the lake?
- What is the impact of salt overloading on the lake?
- What are the consequences of nutrient loading on algal growth (as measured by chlorophyll levels) in the lake?
- What remediation strategies for these and other stressors may be effective?

At Rensselaer, this project partners the pioneering experimental methods of student and faculty researchers at the Darrin Fresh Water Institute with students and faculty across campus, including those conducting leading-edge data and analytics research within the university's Tetherless World Constellation.

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For more information on The Jefferson Project at Lake George visit:

<http://www.rpi.edu/dept/DFWI/>

About Rensselaer

Rensselaer Polytechnic Institute, founded in 1824, is the nation's oldest technological research university. The university offers bachelor's, master's, and doctoral degrees in engineering, the sciences, information technology, architecture, management, and the humanities and social sciences. Institute programs serve undergraduates, graduate students, and working professionals around the world. Rensselaer faculty are known for pre-eminence in research conducted in a wide range of fields, with particular emphasis in biotechnology, nanotechnology, computation and information technology, the media arts and technology, and energy and the environment. The Institute is well known for its success in the transfer of technology from the laboratory to the marketplace so that new discoveries and inventions benefit human life, protect the environment, and strengthen economic development.

About IBM Smarter Planet

With advances in technology — sophisticated sensor networks, smart meters, deep computing and Big Data analytics — IBM is helping clients and cities make smarter decisions about water management. By monitoring, measuring and analyzing water systems, from rivers and reservoirs to pumps and pipes, we can better understand the issues around water. IBM is applying its expertise in smart systems and data analysis to help companies, governments and citizens understand and more effectively deal with these issues. For more information, please visit <http://www.ibm.com/smarterplanet/water>.

About The Fund for Lake George

The FUND for Lake George is a privately funded not-for-profit organization dedicated to the protection of Lake George. Formed in 1980, the FUND applies a science-based approach to protection focused on Lake George water quality and the overall health of the Lake George watershed. The FUND pursues this mission through support of long-term scientific research, direct advocacy, and strategic partnerships with diverse public and private interests. The FUND recently adopted its "Legacy Strategy" that focuses on environmental and economic imperatives as now required to protect Lake George for the next generation. The FUND sponsors the Lake George Waterkeeper among other programs on Lake George. The FUND for Lake George is managed by a Board of Trustees and maintains an office in Lake George. For more on the FUND's work, see <http://www.fundforlakegeorge.org>.

Video, B-Roll and Other Content Available

Registered journalists and bloggers can download b-roll and a video about The Jefferson Project at Lake George at via TheNewsMarket

at: <http://bit.ly/11JtgNJ>

Watch a video on The Jefferson Project at Lake George at:
<http://youtu.be/uARKFSw4ofc>

An infographic visually depicting the project is available at:
<http://ibm.co/11IEvG7>

A blog post from Rensselaer and The FUND is available on the A Smarter Planet Blog at: <http://ibm.co/11NR0N8>

Read a blog post from IBM Research on the project at: <http://bit.ly/14vvuP4>

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“Using Data to Protect Lake George”

Remarks by
Shirley Ann Jackson, Ph.D.
President, Rensselaer Polytechnic Institute

The Jefferson Project at Lake George News Announcement | [News Release](#)
Sagamore Resort, Bolton Landing, NY

Thursday, June 27, 2013

Welcome. We are delighted that you could join us for the launch of an exciting new partnership between Rensselaer Polytechnic Institute—and two longtime partners, IBM and The FUND for Lake George.

Rensselaer has a long history with Lake George, and it was the generosity and vision of David M. Darrin, Rensselaer Class of 1940, and his wife, Peggy, that allowed Rensselaer to establish a scientific platform on Lake George in 1967 in the Margaret A. and David M. Darrin '40 Fresh Water Institute. Since then, Rensselaer has made significant investments in the Darrin Fresh Water Institute and its facilities. We have invested in its researchers and students, and now we are investing in this historic partnership.

Today, I am pleased to announce that IBM, Rensselaer Polytechnic Institute, and the FUND for Lake George will be collaborating on a new three-year, multi-million-dollar effort to monitor, understand, and remediate the water quality of Lake George. Called The Jefferson Project at Lake George, it is named for Thomas Jefferson, who in 1791 judged Lake George as “without comparison, the most beautiful water [he] ever saw.”

Lake George remains uniquely beautiful today—with the water clarity that characterizes such oligotrophic, or low-nutrient, lakes that do not support the growth of large amounts of algae. However, Lake George suffers from a problem common to bodies of water all over the globe: too much human affection. Its water quality is declining as more people are drawn to its shores, as more salt runs into the lake from road de-icing agents, as more boats bring in invasive species such as Asian clams and zebra mussels. There is a dead zone on the south end of the lake whose causes are not yet identified.

We clearly need to devise a more evolved form of co-existence with magnificent but fragile ecosystems such as this one, while assuring its accessibility for those who live and recreate in such areas. Advanced technologies of all kinds—but particularly those that increase our store of useful knowledge—will be crucial to that goal. Here at Lake George, we intend to establish a global model for ecosystem monitoring and understanding. We are going to prove that the most powerful tool of all in environmental protection is data, intelligently aggregated and analyzed.

Two weeks ago, we launched The Rensselaer Institute for Data Exploration and Applications, or The Rensselaer IDEA, specifically to enable applications such as this one—a local application with potentially global influence. The Rensselaer IDEA brings together Rensselaer talents and strengths in high-performance computing, web science, data science, predictive analytics, and immersive technologies—to allow us to tease out and elucidate emergent questions and issues for the first time, and to arrive at new solutions to lingering problems.

Initiatives such as this one are only possible because over the last fourteen years, we have put into place the people, platforms, programs and partnerships that have transformed Rensselaer into world-class technological research university. Now, when we talk about our second generation strategic blueprint -- the Rensselaer Plan 2024, and, with it, and our intention of becoming transformative in the global impact of our research, The Rensselaer IDEA and The Jefferson Project are precisely what we mean.

For The Jefferson Project, we have a foundation in an historical 30-year data set on the water chemistry of Lake George that is the product of decades of collaboration between the Rensselaer Darrin Fresh Water Institute and the FUND for Lake George.

To that, IBM and Rensselaer will add a remarkable cyberphysical platform that will allow real-time data monitoring, including fixed sensors, sensors mounted on robots, and innovations such as flow-cams that can take snapshots of the lake's microscopic organisms and transmit them in real time.

A state-of-the-art mesocosm facility—mesocosms are tools that allow for controlled conditions within the lake—will give us an experimental platform to allow scientists to determine how the food web, for example, reacts to different salt concentrations.

A high-performance computing platform at Rensselaer, as well as IBM and Rensselaer innovations in data modeling, analytics, and visualization, will allow the circulation patterns in the lake to be comprehended for the first time. Professor Deborah McGuinness of Rensselaer's Tetherless World Constellation is developing the tools to contextualize the data collected here, and to integrate it so that trends and correlations become apparent—as well as allowing it to be “mashed up” with relevant related data, including data that the Darrin Fresh Water Institute has collected on 35 Adirondack Lakes.

One of the main goals of The Jefferson Project is to give scientists the predictive capabilities that will allow us to

understand the future of the lake under different scenarios. With the knowledge generated by this work, policymakers and community members alike will be able to make the right decisions to keep Lake George forever crystalline.

I believe science needs to inform public policy, not the other way around.

The beauty of Lake George is timeless. Today, we take an important step to ensure that it also is endless—and that it teaches us important lessons in protecting water resources around the globe.

Thank you.

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Page updated: 7/3/13, 9:16 AM

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