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10-27-2015

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### Recommended Citation

USU College of Engineering, "Tackling Salinity in the Colorado River One Ion at a Time | Biological Engineering" (2015). *College of Engineering News*. 46.

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# Tackling Salinity in the Colorado River One Ion at a Time | Biological Engineering

**10/27/2015**

10/27/2015 - It's one of the most overtaxed waterways on the planet, and its shrinking flow is only part of the problem.

The Colorado River travels 1,500 miles through seven U.S. states before reaching the Gulf of California. Throughout its long journey the river supplies water for approximately 40 million people and is used to irrigate more than five million acres of land in the Western U.S. and Mexico.

But along its journey, the Colorado picks up and transports millions of tons of salt left over from geologic sediments and agricultural runoff. By the time it reaches the lower basin, salinity concentrations can be high enough to ruin crops and damage soil. The U.S. spends millions of dollars each year to combat salinity, and entire government programs are dedicated to improving farming practices that reduce how much salt leaches into the river.

Associate professor of biological engineering Dr. Anhong Zhou has developed an innovative method to measure the concentration of specific salt compounds in water. He and his team patented an inexpensive, reusable handheld device that can detect the concentration of sulfate ions. Measuring sulfate and other salt compounds, and identifying their sources, is the first step at improving salinity control.

"There are dozens of ions in the water but only a few of them contribute significantly to the salinity problem," said Zhou. "The current probe to detect salinity is based on conductivity measurements, but that only indicates an overall presence of salt. It doesn't tell you what ions and at what concentration."

Because much of the salt in the Colorado gets picked up in the river's upper basin, researchers want to know what ions are present in the river in regions of Eastern Utah.

"We've invested almost as much as we can to control salts coming from irrigated lands," says Utah Water Research

Laboratory Director Mac McKee. "There's almost no opportunity left to reduce salts coming from irrigated lands, and yet we still have salty water."

He and other experts agree: identifying sources of these ions – including sulfate – in the upper basin will help researchers better understand how to manage the total salt load in the Colorado River.

"We're looking at several hundred million dollars a year in quantified damages to lower basin users," said Don Barnett, executive director of the Colorado River Basin Salinity Control Forum. "The effects include decreases in productivity in irrigated agriculture; in industry it increases costs to use water; in the public sector it degrades pipes and leads to corrosion and scaling problems."

Zhou says several companies are showing interest in the device and a similar technology he developed that can detect microorganisms in water including cryptosporidium.