Space station-inspired mWater app identifies healthy water sources

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This is a screenshot of the global water source map people can visit to find data uploaded by mWater users across the globe. Credit: mWater

What if that clear, sparkling stream coming from the ground or a faucet were teeming with contaminants? How would you know? Whether you live in some remote region of Africa, a high rise in New York City or aboard an orbiting laboratory in space, you need reliable drinking water to survive. You now can check for yourself the cleanliness of your water using the mWater app on your mobile phone.

This handy tool, based in part on International Space Station technology, provides a global resource available for free download as an app or usable via the Web browser version of the app on most smartphones. Governments, health workers and the public all can make use of mWater to record and share water test results. During the first year of the beta release of mWater, more than 1,000 users downloaded it and mapped several thousand water sources.

John Feighery, mWater co-founder and former lead engineer for air and water monitoring with NASA, was inspired by his work for the space station. There, he and his team created efficient, mobile and ambient testing techniques to test for contamination in drinking water sources without the need for costly lab equipment such as incubators. The resulting Microbial Water Analysis Kit (MWAK)—part of the environmental monitoring Crew Health Care System Environmental Health System (CHeCS EHS) suite aboard station—sparked Feighery's imagination, providing the basis for the mWater testing of *E. coli* in 100 milliliter (3.38 ounce) water samples.

"The key innovation that came from NASA was proving that these types of tests can still work at near ambient temperatures," said Feighery. "We now know from various studies that any temperature above 25 degrees Celsius (77 degrees Fahrenheit) will produce a result, whereas traditional laboratory procedures call for incubation at 37 degrees Celsius (98.6 F). This is very important for developing countries because incubators are expensive and require reliable electricity, and also can easily break down. Since many of the countries that suffer from poor access to safe water are tropical, the tests can easily be done by anyone at room temperature most times of the year."

Hefting testing materials or expensive equipment to test water sources is unrealistic, Feighery discovered while volunteering with Engineers Without Borders in El Salvador. Portable, inexpensive and effective, that's the goal for technologies bound for the defined real estate of the space station, but also for those needed in remote or low-resource regions of the world. Low cost mWater test supplies run users $5 per kit.

Combining his aerospace experience and philanthropic passions, Feighery went to work with co-founders Annie Feighery and Clayton Grassick on what would become mWater. "The app was developed following the 2011 Water Hackthons and later improved through field testing sponsored by

U.N. Habitat," said Feighery "The app makes it much easier to record water quality results, map water sources or find safe water nearby."

The tests and app are both designed with ease of use in mind. The user tests the water, allows the test to incubate at ambient temperatures, photographs the results to count the bacteria and finally uploads the findings to the global water database. Ease of use was key to Feighery's design goals.

"The lessons I learned from writing crew procedures definitely influenced the design of the app, which is task-oriented and designed to require very little training beyond following the procedure," said Feighery. "In the near future, we plan to introduce checklists for each type of water test to further improve ease of use and reduce the training needed to perform field testing."

Test results upload to the cloud-based global water database, using the phone's GPS to identify the exact location of the water source. Each location gets a unique and permanent numeric identifier for reference by those who visit the global water source map for updates. Users can add new water location points and input or update test results, working within the open source sharing approach for the health of the community.

Provided by NASA