

Tracking agricultural water use on a smartphone

October 14 2015, by Alison Ogden

This fall scientists at the University of Nebraska, with partners at Google, Inc. and the University of Idaho, introduced the latest evolution of METRIC technology—an application called EEFLUX, which will allow anyone in the world to produce field-scale maps of water consumption.

METRIC processes satellite images to make digital maps, and is currently being used by water managers in 15 states to track agricultural water use. EEFLUX will put this information directly into the hands of farmers by allowing them to check water-use maps in near real-time on any mobile device that has web access.

"The use of satellite imagery provides the means to monitor the agricultural water consumption over every square foot of land surface," said Ayse Kilic, a professor in the department of civil engineering and school of natural resources at the University of Nebraska.

That imagery comes from the Landsat satellites, whose thermal band data allows water specialists to measure the amount of water evaporating from the soil and transpiring from a plant's leaves—a process called evapotranspiration (ET).

This process cools the plant down, so irrigated farm fields appear cooler (bluer) in infrared [satellite images](#). The spatial resolution of Landsat's thermal imagery, combined with the Landsat data for other spectral bands, allows experts and farmers alike to see water consumption for

individual fields.

"With Landsat 7, the Landsat user community began to see the importance of thermal infrared data for [water management](#)," said Jeffrey Masek, Chief of the Biospheric Sciences Laboratory at NASA's Goddard Space Flight Center in Greenbelt, Maryland. "So in 2009 the Thermal Infrared Sensor (TIRS) was added to the Landsat-8 mission payload.

Water managers can track the effectiveness of various water conservation projects with METRIC because it provides a new level of detail: from field to field, crop to crop, and year to year. Also, Landsat satellites have collected thermal data since 1984 so that water consumption under existing conservation practices can be compared with that occurring more than 30 years ago.

"It's really helped us from a time-frame perspective," said Duane Woodward, an engineering hydrologist at the Central Platte Natural Resource District of Nebraska. "1997, for example, was one of the first ET years. We did 2007, 2002, 2011, and now we're doing 2013. So you really want to look at how its changing year in and year out."

METRIC was developed by remote sensing analysts Bill Kramber and Tony Morse, from the Idaho Department of Water Resources, who in the early 2000s teamed up with Rick Allen, from the University of Idaho, to develop a more holistic solution to [water](#) management.

So far, METRIC'S latest application, EEFLUX, has been introduced to the California Department of Water Resources, the California Water Control Board, and the World Bank. "Having [water consumption](#) maps produced quickly on Smartphones has been everyone's dream," said Kilic. "In two years time we hope to see all farmers watching their fields from their phones and scheduling irrigations. EEEFlux is making

Landsat the evapotranspiration satellite."

Provided by NASA's Goddard Space Flight Center

Citation: Tracking agricultural water use on a smartphone (2015, October 14) retrieved 24 April 2024 from <https://phys.org/news/2015-10-tracking-agricultural-smartphone.html>

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