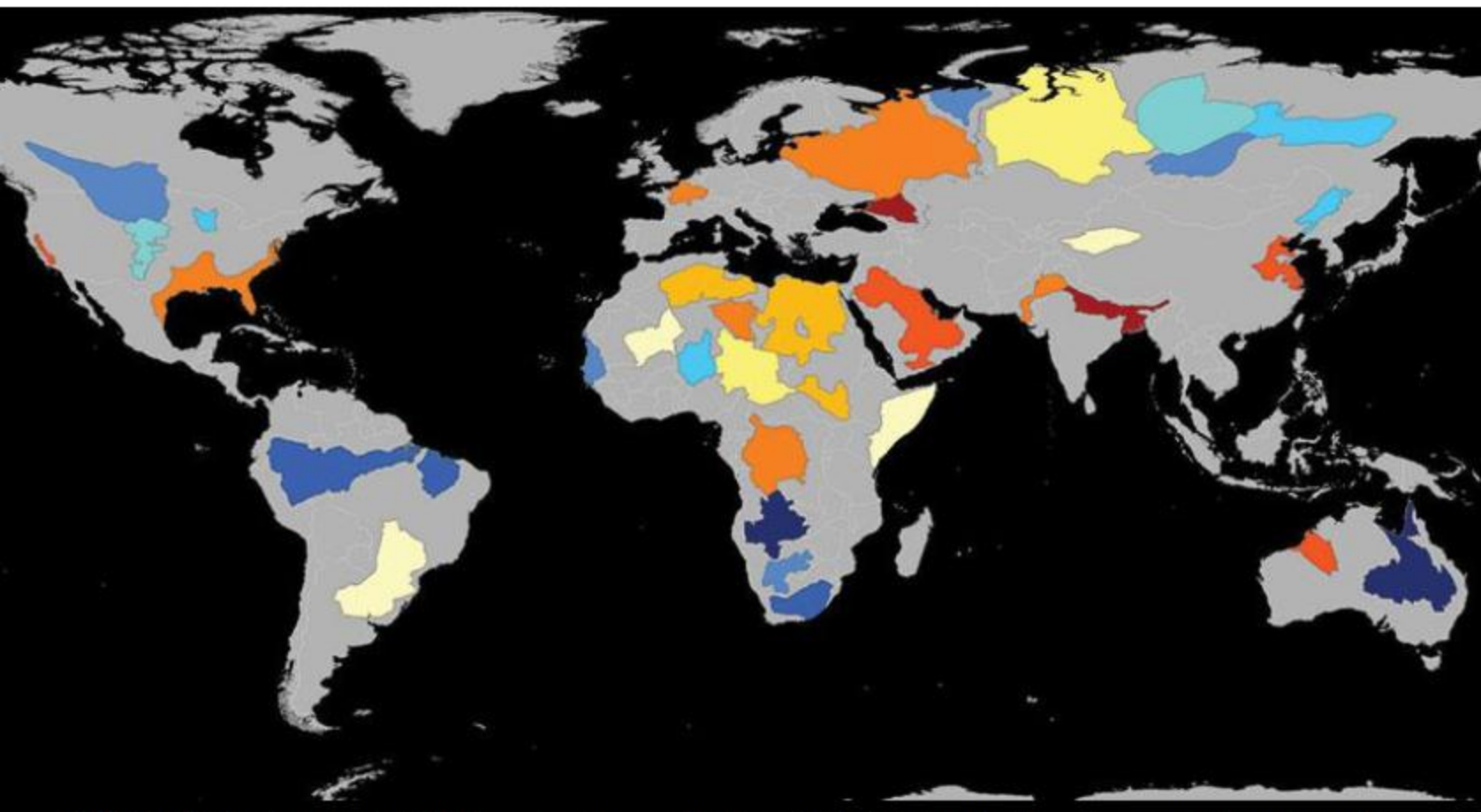
NEWS AGRICULTURE, EARTH, CLIMATE

Many of Earth's groundwater basins run deficits

Consumption exceeds replenishment for majority of largest aquifers

BY **THOMAS SUMNER** 1:30PM, JUNE 18, 2015



DRYING OUT Twenty-one of Earth's 37 largest aquifers are dwindling, satellite data show. Redder regions represent overstressed aquifers that lose more water each year than they take in.

UC IRVINE, NASA

Climate and human consumption are parching Earth's groundwater basins at an alarming rate, a new study finds. Of Earth's 37 biggest groundwater basins, 21 now lose more water annually than they take in, researchers report in a paper to be published in *Water Resources Research*.

That's troubling, says study coauthor Sasha Richey, a hydrologist at Washington State University in Pullman. Groundwater quenches the thirst of about 2 billion people, provides irrigation for crops and helps keep wetlands wet.

"People need to think about groundwater as an important resource," Richey says. "We're not managing that resource adequately, or even at all, in most of the world."

Scientists typically monitor groundwater reserves using wells, but this method fails to provide the global picture of how water levels are changing. Richey and colleagues instead used data collected by GRACE, twin NASA satellites that measure small changes in Earth's gravity. As water pools underground, the satellites record a stronger gravitational tug.

The researchers examined gravity changes measured from Earth's largest aquifers from 2003 through 2013. Eight of the studied aquifers lost significant water over the decade and were classified as overstressed, with nearly no natural water replenishment to offset withdrawals. The regions of greatest concern were the Arabian Aquifer System in the Middle East, the Murzuk-Djado Basin in northern Africa and the Indus Basin in northwestern India and Pakistan.

The most dried-up aquifers commonly had large populations nearby, substantial local agriculture or an arid climate. All three factors probably contributed to the Californian Central Valley Aquifer System rating as extremely stressed, Richey says. California's groundwater withdrawals have skyrocketed recently in response to the state's ongoing drought.

While GRACE provides valuable information about how global groundwater has changed, it can't measure exactly how much water is left in the aquifers, says Gordon Grant, a hydrologist at the U.S. Department of Agriculture Forest Service in Corvallis, Ore. Despite that shortcoming, the new work "allows us to put our arms around the volumes of water that are in play and better understand, like an accountant would, withdrawals and deposits of groundwater around the world," he says.