

SCIENTISTS CREATE A GLOBAL MAP OF WHERE GROUNDWATER MEETS OCEANS

Relevant for: Geography | Topic: Distribution of key natural resources - Water Resources incl. Rivers & related issues in world & India

Aquifers: Regions near active fault lines send greater volumes of groundwater into the ocean than tectonically stable ones. | Photo Credit: [K R DEEPAK](#)

Scientists have created high-resolution maps of points around the globe where groundwater meets the oceans — the first such analysis of its kind that may help protect both drinking water and the seas.

In a study published in the journal *Geophysical Research Letters*, researchers from The Ohio State University in the U.S. showed that nearly one-half of fresh submarine groundwater discharge flows into the ocean near the tropics.

They also found that regions near active fault lines send greater volumes of groundwater into the ocean than regions that are tectonically stable.

They found that dry, arid regions have very little groundwater discharge, opening the limited groundwater supplies in those parts of the world to saltwater intrusion.

The team worked with researchers at NASA's Jet Propulsion Laboratory and the University of Saskatchewan to combine topographical data from satellites and climate models to show the flow of groundwater around the world's coasts.

The findings may help coastal communities better protect and manage their drinking water.

"Freshwater-groundwater discharge is a natural line of defense against saltwater intrusion," said Audrey Sawyer, an assistant professor at Ohio State.

"It's a problem that dry regions have as little groundwater discharge as they do because these are also the places where people are going to tend to look for groundwater to meet their freshwater needs," said Dr. Sawyer.

The research work, the first near-global and spatially distributed high-resolution map of fresh groundwater flow to the coast, could give scientists better clues about where to monitor groundwater discharge.

When researchers think about coastal water quality and the way water affects the biochemical makeup of the world's lakes and oceans, they typically think about rivers and streams — and for good reason. Most of the water that gets to lakes and oceans comes from surface water sources. However, groundwater plays an important role, too, carrying minerals and, in some cases, pollutants, to surface bodies of water.

"If you've ever been swimming in a lake or in the ocean in the summertime and you go through a cold patch, that is probably a place where groundwater is coming out," Dr. Sawyer said.

"And that's just one way that groundwater affects surface water — in that case, it's affecting temperature, but it also affects the chemistry of the water. These effects can be hard to measure

over large scales,” he said.

The team started building these images. The research group focuses on groundwater, and realised that there was limited information showing where groundwater was most likely to flow into the oceans.

The study found that in some parts of the world, groundwater could be polluting oceans and lakes with nutrients and other chemicals.

Groundwater, for example, can carry higher concentrations of nitrates — a key contributor of the types of harmful algal blooms — as well as high concentrations of mercury.

Understanding how and where groundwater gets to surface water could help policy-makers create better plans to improve those bodies of water.

The study also found that climate heavily influences groundwater flow, and that cities in dry areas are especially vulnerable to salt water contamination of aquifers.

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