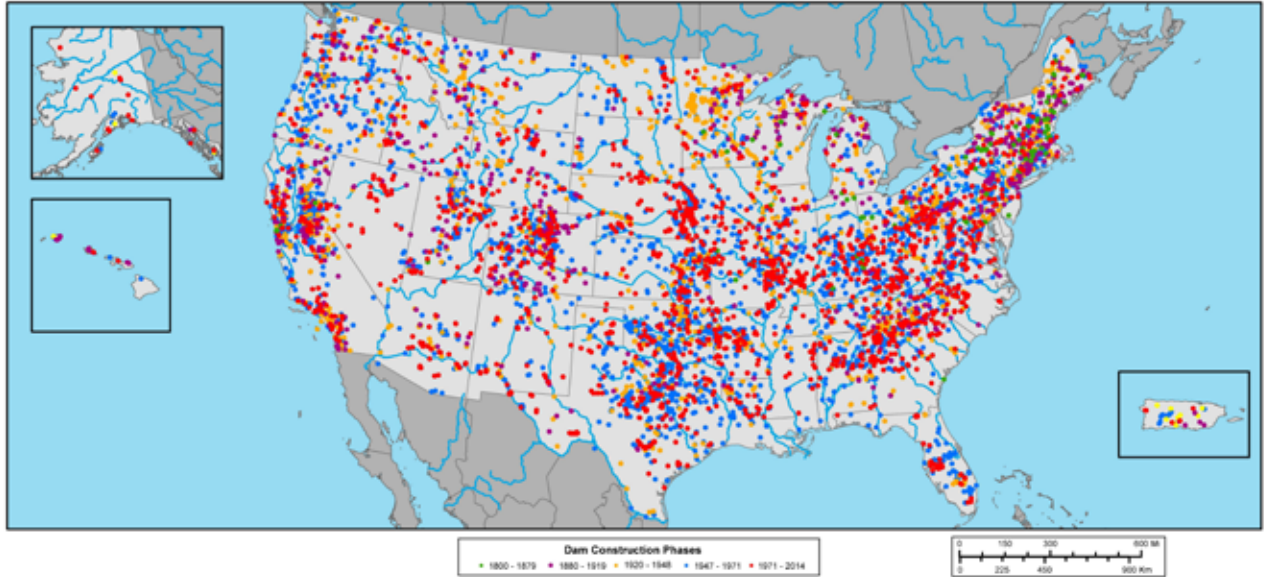


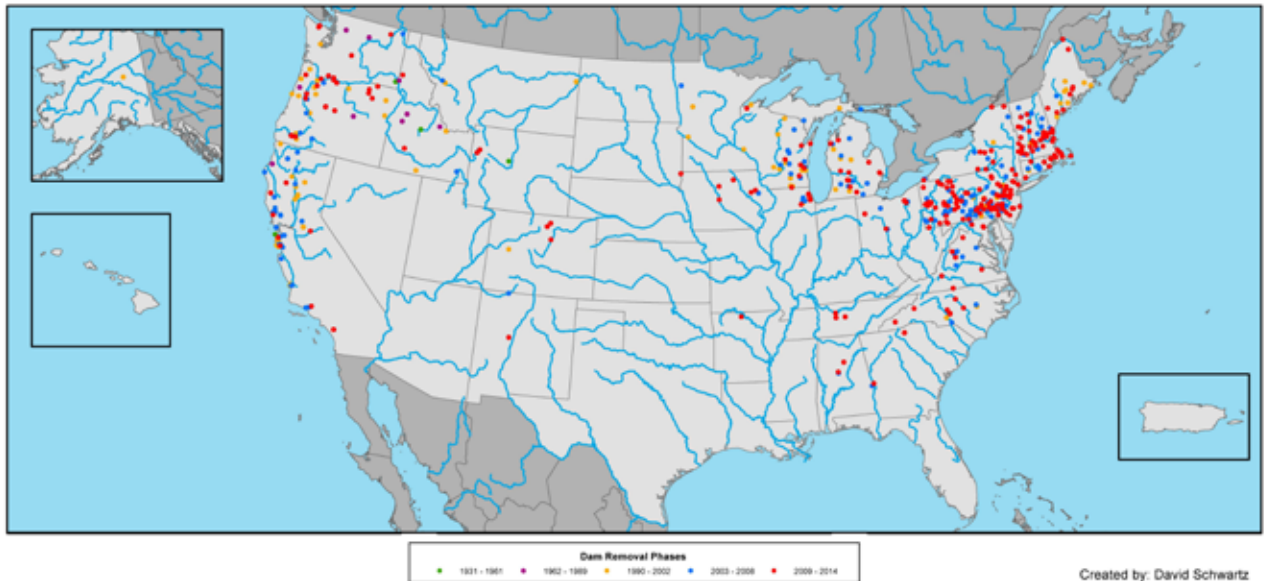
Dam Construction Phases in the United States



In these maps we can see most of the 8,000 major dams and their distribution over time in this country. The designated phases show that dam construction primarily occurred in the mid to late 20th century with an overall expansion from East to West following the settlement and migration of people. In addition, the maps below show the removal of 600 dams for reasons as various as emergency management, river restoration, and flood control.

Source listing: AmericanRivers.org, Data.gov, parks.NV.gov, Ca.gov, mvp.usace.army.mil, Rivers.bee, Orgeonstate.edu

Dam Removal Phases in the United States



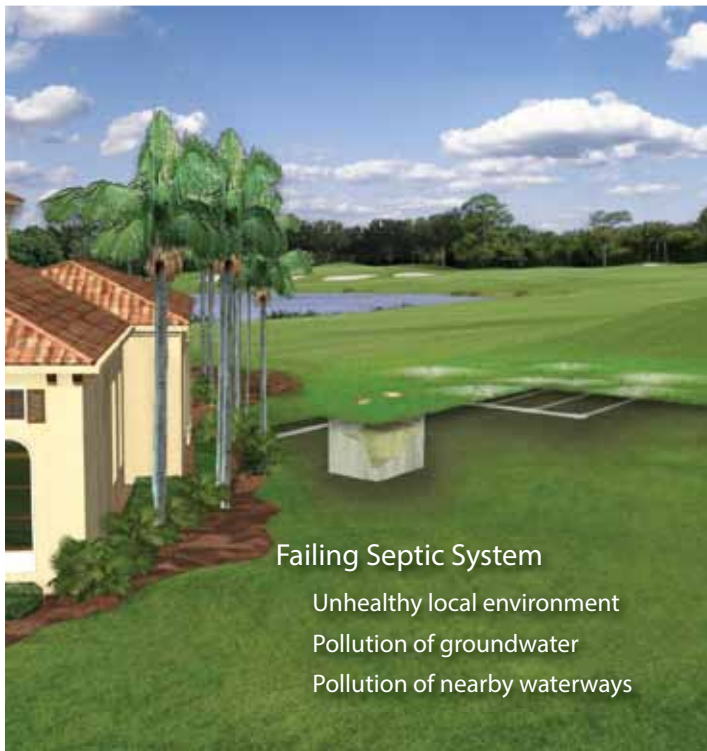
Created by: David Schwartz

■ Following a successful crowd-funding campaign that raised almost \$28,000, Guerrilla Cartography (Oakland, Calif.), a loose coalition of mapmaking enthusiasts, released *Water: An Atlas* in November 2017. The images on the next few pages show examples from this work.

For this compilation, 80 volunteer mapmakers from around the world worked on the atlas. It presents rarely considered sides of how human water use shapes the planet and vice versa.

The map shown here, contributed by California State University (Long Beach) graduate student David Schwartz, offers a timeline of dam construction and removal in the United States from 1800 to 2014, illuminating a pattern that follows westward human migration. David Schwartz/Guerrilla Cartography

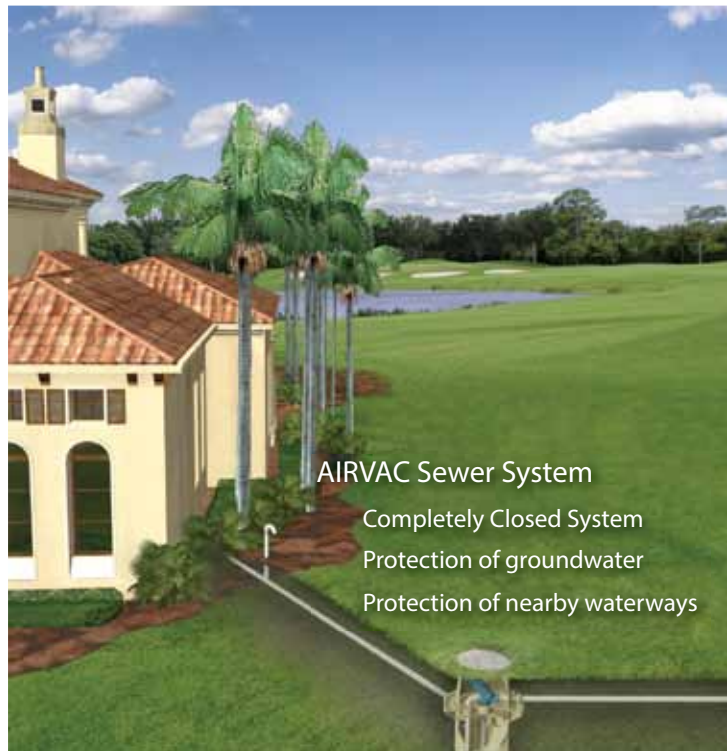
POLLUTION



Failing Septic System

- Unhealthy local environment
- Pollution of groundwater
- Pollution of nearby waterways

SOLUTION



AIRVAC Sewer System

- Completely Closed System
- Protection of groundwater
- Protection of nearby waterways

The economical and ecological wastewater collection system.

One failing septic system can lead to localized groundwater pollution. The problem is much worse when this occurs on a community-wide basis. Pollution from multiple failing septic tanks can be a contributing factor in harmful algal blooms in nearby waterways that are home to wildlife. Airvac can help.

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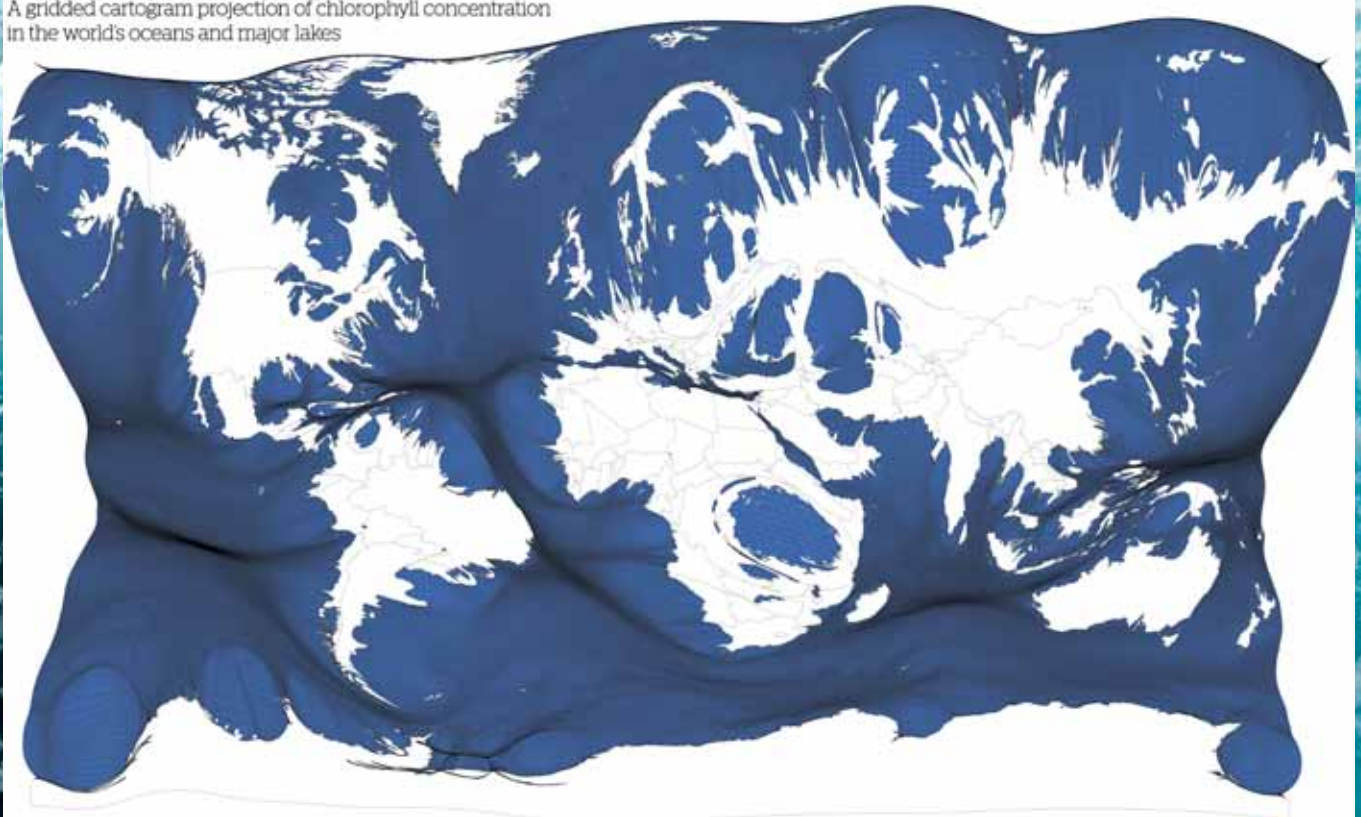
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Where the algae grow

A gridded cartogram projection of chlorophyll concentration in the world's oceans and major lakes



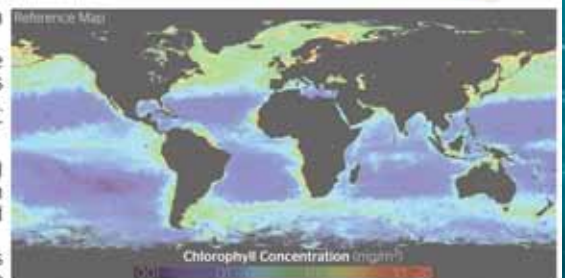
This is a gridded cartogram made from satellite sensor observations about long-term chlorophyll concentration estimates in the world's oceans and largest lakes.

Chlorophyll concentrations in the world's oceans are important indicators for the presence of algae and other plant-like organisms that carry out photosynthesis. Variations and changes in the chlorophyll levels are relevant for the study of the ecology of the sea. Changing chlorophyll levels can also indicate changing sea temperatures and other changing conditions in the oceans that cover about 72% of the planet's surface.

The visualisation shows the quantitative distribution of global chlorophyll concentration as highlighted in the smaller reference map. In a 'gridded cartogram', each of the grid cells shown covers an equal physical space of water area and is then resized according to the total amount of chlorophyll measured in this area.

Sea areas with the highest density of algae and other photosynthetic organisms appear largest while areas with low concentrations disappear into dark black areas where the grid cells converge. The map highlights the increasing levels at most of the coastal zones of the continents which appear as bizarrely distorted white islands in the sea.

Higher levels can be seen along the west coasts of the Americas as well as Africa where rising cold water streams lift nutrients from the ocean floor that support phytoplankton growth. Coastal upwellings also influence the high chlorophyll concentrations of the surface waters in the Baltic Sea. This is also case for the largest lakes, such as Lake Victoria in Africa. In contrast, the dark band of low chlorophyll levels around the Equator eastwards the coast of South America is influenced by the easterly trade winds that also help the upwelling of deeper water layers.



Data source:
MODIS, NASA Earth Observations (2014)

Author:
Benjamin D Hennig, University of Iceland
www.viewsoftheworld.net

Topics in *Water: An Atlas* are diverse. They range from how water has been used as a weapon in recent conflicts in Iraq and Syria to speculations on where the fabled underwater city of Atlantis might be located. They also run the gamut of complexity.

This map, contributed by Benjamin Hennig from the University of Iceland (Reykjavik), uses satellite observations to chart chlorophyll concentrations and algae growth in lakes and oceans throughout the world. Benjamin D. Hennig/Guerrilla Cartography

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Bottled Water in the Great Lakes Basin: Who's Buying and Who's Selling?

Our relationship with water is conflicted. We are all born in water, our bodies are mostly water, and every other living element on this earth depends on water, and yet we manage water as just a resource and commodity. The Great Lakes bioregion is gifted with 20% of the world's surface freshwater and each day it gives 40 million people their drinking water. How we understand and govern bottled water in this region is critical.

This map should not exist. Information on water withdrawals is rarely integrated across political boundaries and is seldom aligned with watershed boundaries. We need to question how this patchwork of data, permits, and politics affects our bond with water.

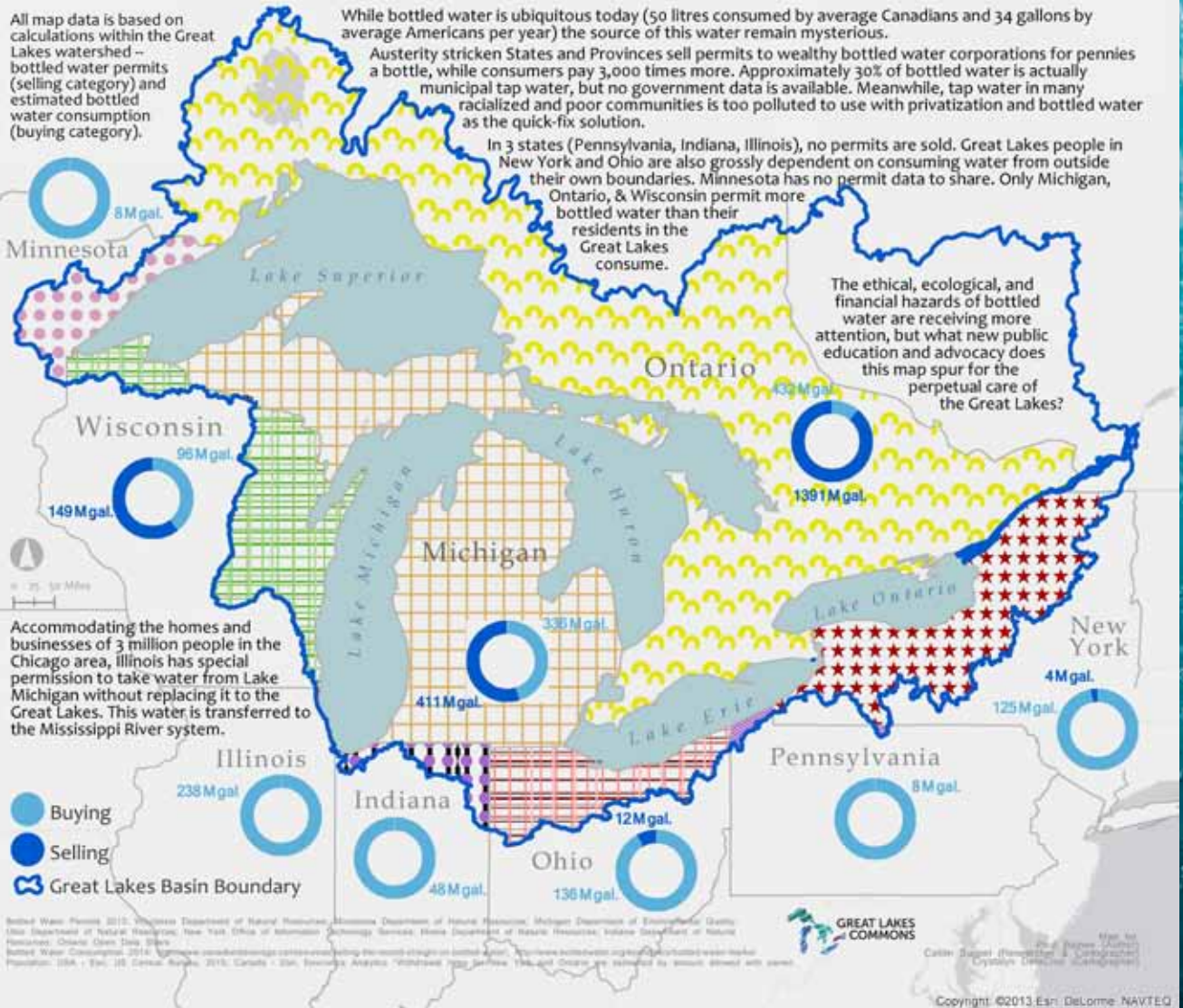
All map data is based on calculations within the Great Lakes watershed – bottled water permits (selling category) and estimated bottled water consumption (buying category).

While bottled water is ubiquitous today (50 litres consumed by average Canadians and 34 gallons by average Americans per year) the source of this water remain mysterious.

Austerity stricken States and Provinces sell permits to wealthy bottled water corporations for pennies a bottle, while consumers pay 3,000 times more. Approximately 30% of bottled water is actually municipal tap water, but no government data is available. Meanwhile, tap water in many racialized and poor communities is too polluted to use with privatization and bottled water as the quick-fix solution.

In 3 states (Pennsylvania, Indiana, Illinois), no permits are sold. Great Lakes people in New York and Ohio are also grossly dependent on consuming water from outside their own boundaries. Minnesota, Ontario, & Wisconsin permit more bottled water than their residents in the Great Lakes consume.

The ethical, ecological, and financial hazards of bottled water are receiving more attention, but what new public education and advocacy does this map spur for the perpetual care of the Great Lakes?



Distribution is a major focus of *Water: An Atlas*, as seen in this map by researchers with Great Lakes Commons (Minneapolis, Minn.). The map depicts how much water each of the U.S. states and Canadian provinces bordering the five Great Lakes draws for use in bottled water. Paul Baines, Crystalyn Delacruz, and Caitlin Scopel/Guerrilla Cartography



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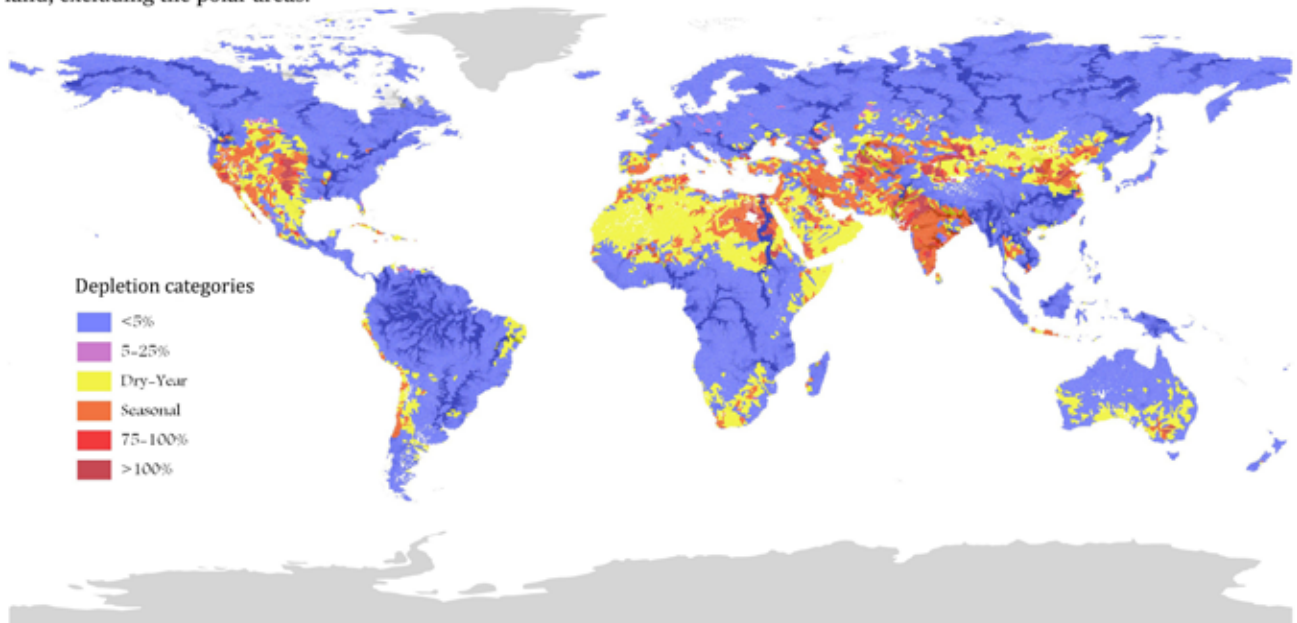
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Water Depletion in Global Watersheds

A continental perspective

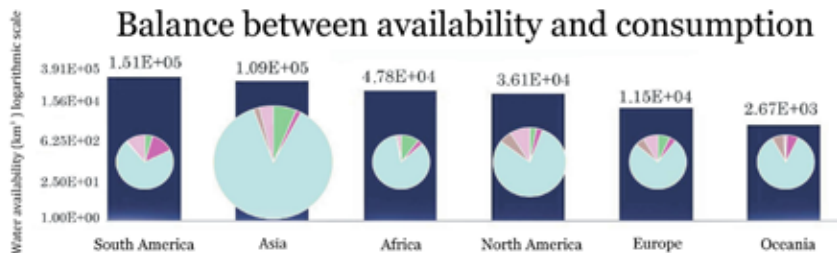
Water depletion describes the fraction of available, renewable surface and groundwater that is consumed by human activities. A large fraction of annually available water may be used up every year (percentage categories), or water may be scarce only during certain times of year (seasonal depletion) or during dry years. This map illustrates water depletion based on water availability between 1971 and 2000 and water use in the year 2005. It includes 15,091 watersheds larger than 1,000km², constituting 90 percent of the world's land, excluding the polar areas.



Depletion categories



Balance between availability and consumption



Consumption by sector



Consumed water (km³)



"Balance between availability and consumption" logarithmic graph reading guidelines:

A logarithmic scale allows us to visually mitigate the differences between regions while presenting the relative amounts between them. For example, the difference between South America's and Oceania renewable surface and groundwater availability (151,000 km³ vs 2,670 km³, respectively) is too drastic to show on this map, but a logarithmic rather than a linear scale can still help us represent relative water availability in different regions. "E" notation has been used instead of standard notation; 1.51E+05 translates to 1.51x10⁵.

Map and graphs based on data used and generated in the study "Water depletion, an improved metric for incorporating seasonal and dry-year scarcity into water risks assessment". Authors: Kate A. Brauman, Brian D. Richter, Sandra Postel, Marcus Maly, Martina Flörke; published in the Journal Elementa Science of the Anthropocene 2016;4:83.

Cartographers: Perrine Laroche, Natalee Desotell

During the crowd-funding campaign for *Water: An Atlas*, 72 backers had the opportunity to choose local schools and libraries to receive free copies of the finished book. With the goal of using Internet-enabled collaboration to spread water awareness across the world, a free digital download of *Water: An Atlas* will be made available on the Guerrilla Cartography website, www.guerrillacartography.org. Natalee Desotell and Perrine Laroche/Guerrilla Cartography

Water Environment Federation

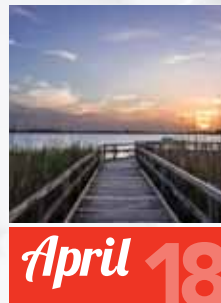
TRAINING AND EDUCATIONAL EVENTS

'18



Odors and Air Pollutants

March 25–28
Portland, Oregon
wef.org/OdorsAir



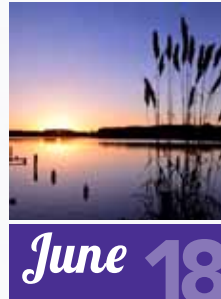
Collection Systems

April 8–11
Virginia Beach, Virginia
wef.org/CollectionSystems



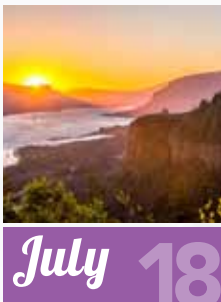
Residuals and Biosolids

May 15–18
Phoenix, Arizona
wef.org/ResidualsBiosolids



Nutrient Removal and Recovery

June 18–21
Raleigh, NC
wef.org/Nutrients



Disinfection & Reuse Symposium

July 29–31
Portland, Oregon
wef.org/DisinfectionReuse

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New Orleans, Louisiana | weftec.org