ART BY KATE GOODVIN

RUNNING OUT OF WATER

By Lottie **Gidal**

Water. It's the one thing we can't live without. Humans can last without food for over three weeks (Gandhi is a famous example of this; he starved himself for over 21 days in protest of the British occupation), but without water, we die in a matter of days.

Most of us consider access to this invaluable resource as fairly simple; turn on a tap, and fresh, clean water pours out. In 2010, the U.N. declared access to water a human right, and since then, global efforts have increased the number of humans who can say they have it. A lot of whether or not you have that access depends on where you were born. Canada is one of the richest countries in the world in terms of water per capita, and countries such as Sudan or Yemen are some of the poorest, despite having similar population levels. So as the world's population booms, the question increasingly becomes: is there enough water to go around?

The answer? No, there isn't.

You may remember hearing about Cape Town, South Africa's water crisis in early 2018. Climate change had helped plunge the region into the worst drought it had seen in a century, forcing the city to declare 'Day Zero' on March 18, when the water would simply run out. But it's not just Cape Town. Sao Paolo, Jakarta, London, Tokyo, Melbourne, Beijing, Istanbul, Bangladesh, Barcelona, and Mexico City will all face their own 'Day Zero' in the next several decades, as the global demand for water will surpass the supply as soon as 2030, 11 years from today.

What is causing this rapidly increasing demand for water? What measures can we take to change how we treat and use our most valuable resource? What will be the consequences if we don't?

ART BY **HAILEIGH ST**

How can we preserve water?

1. **The United State's crumbling infrastructure system causes over 2 trillion gallons of water to be lost every year, that's roughly 18% of our treated water. Harsh winters like this current one are especially hard on pipes that can be over 70 years old. But the amount of money needed to fix the system counts in the trillions of dollars.**

2. As Agriculture makes up the vast majority of water consumption, scientits are looking for any way to help use less of it. Currently, 60% of the water diverted for growing crops and feeding livestock is wasted-either from leaky pipes or by evaporating due to inefficient irrigation techniques. 95% of the world's irrigated farmland uses the most innefficient method; flooding the fields.

3. **Roughly 30% of all food produced in the world is wasted or thrown away. Changing our habits (and portion sizes) would make an enourmous difference in the water consumed.**

4. Climate change is quickly causing already wet areas to experience heavy flooding, and dry areas extreme droughts. Access to that 0.05% is becoming erratic and unrelaible. Droughts cause populations to overuse their groundwater resources, a non-replenishable source. The US has seen the devastating effects of flooding and hurricanes, worsened by warming ocean temperatures, in Houston, Florida, and Louisiana.

5. **Changing where we grow crops, so the most waterless regions aren't growing the most water consuming crops.**

With the existing climate change scenario, by 2030, water scarcity in some arid and semi-arid places will displace between 24 million and 700 million people ents with the water it uses in it's wine industry alone.

1.2 billion people, or 20% of the world's population live in areas of water scarcity, defined as when water withdrawals exceed 75% of the water supply

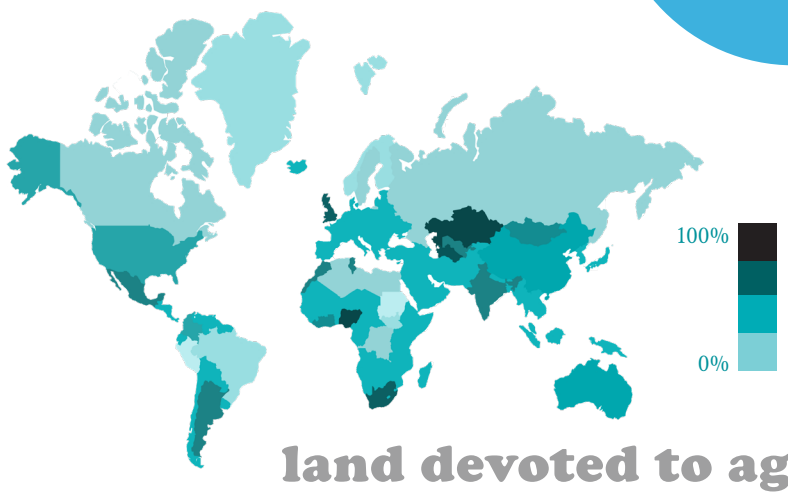
The U.S. withdraws 322 billion gallons of water per day

The last time the federal government performed a water assesment was the 1970s

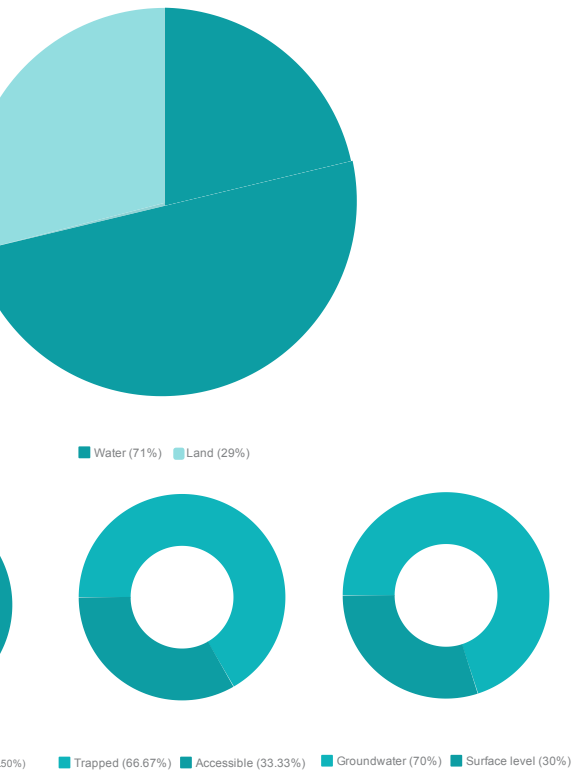
The water footprint of the US is more than double the world average

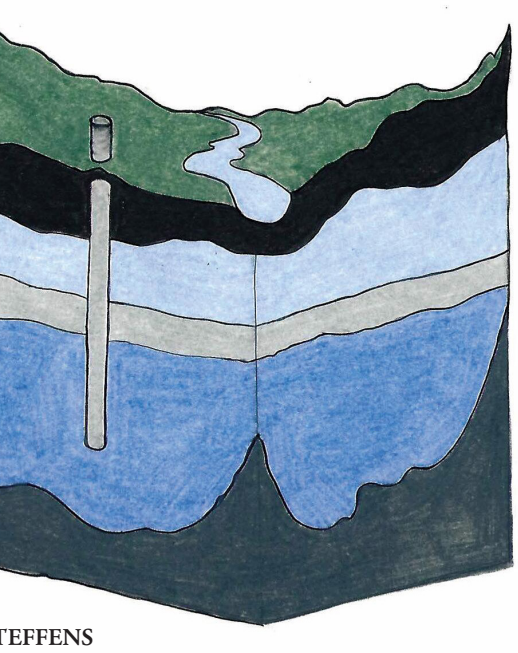
The world's population has grown from 1 billion in 1800 to 7.6 billion in 2018. Projections place total population at 8.6 billion by 2035 and 10 billion by 2050.

water stressed countries



land devoted to agriculture





TEFFENS

When you look at the earth, what do you see? A massive planet covered mostly in water: 71 percent, to be exact. The oceans hold 96.5 percent of the Earth's water, leaving just under three percent of all water on the planet non-saline freshwater. Of that three percent, over 2/3 is trapped in ice and glaciers at the poles. So humans have had to make do with that one percent

However, about 70 percent of that one percent exists as groundwater and is extremely difficult to access. We are accustomed to using the <0.3 percent of water that flows in surface-level lakes and rivers. That is a set amount. The water isn't going anywhere. But the ways in which we use it are.

On average, humans need to drink a gallon a day to function normally. Every time you flush a toilet, it uses 3.6 gallons; a shower takes 17.2. But personal consumption, things like running the dishwasher or sinks in the bathroom, only account for about eight percent of water consumption. Agriculture uses over 70 percent, and industry the other 20 percent. The vast majority of accessible water is embedded in the food and water we consume. The amount of water in a bottle of Coke is not what you see in the bottle. It's embedded in the ingredients used to produce the drink, the water it takes to grow feed, sugar, etc.

Cape Town could have enough water for all 4 million of its residents with the water it uses in its wine industry alone.

Aquifers

Remember the more than 70% of water trapped underground? Some of it exists in shallow aquifers–groundwater accumulates in pockets under top layers of soil and rock as a result of precipitation. This is then filtered down through layers of porous rock and accumulates in pockets called aquifers. The rate of replenishment depends on the type of porous rock that covers the surface, but most aquifers, if completely drained, would take hundreds of years to fill back up again. And the majority of aquifers we draw on are much deeper, precipitation doesn't affect the ancient water that is trapped down there, once its gone, its gone. The U.S. Geological Survery compared aquifers to a savings accounts–its okay to draw from them once in a while when you're in trouble, but any more than that and you will quickly run out. Except that's not how we treat them.

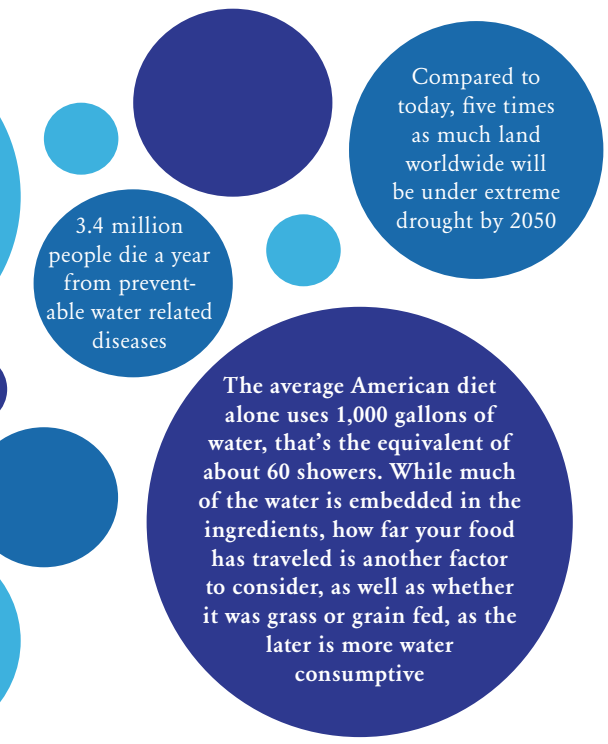
Over 50% of the US relies on groundwater

California is currently suffering it's worst drought in recorded history, and has upped their use of groundwater dramatically, rising over 20%. And there's no restrictions, people are allowed to draw as much water as they'd like, as groundwater levels are kept secret from the public.

In 2018, NASA released satellite data that showed worldwide shifts in precipitaion and groundwater levels; with wet aresas getting wetter and dry areas getting drier. Since those dry areas are the ones that rely heavily on groundwater, a loss in precipitation is putting the aquifer levels in a downwards spiral, as the rate of withdrawal only grows. And as those underground water levels lower, the cost of the energy required to pump the water up to the surface becomes more and more prohibitve. In California the cost of pumping up from a single well is approximately $300,000. And while we pump more and more water, the ground actually starts to subside-or sink as the soil compressed. Mexico City is sinking at a rate of up to nine inches per year. In China it is even worse. As groundwater levels have dropped as much as 45 feet in the last 50 years, sections of the Great Wall have been buried by sand, and it is estimated large portions will disappear completely in the next 10-20 years if action is not taken.

For decades the Ogallala aquifer in the US (one of the largest in the world) has been withdrawing at a rate thousands of times greater than its being restored

There are also concerns that aquifers are becoming contaminated. Opponents of fracking, the process of drilling for underground oil by shooting high pressure water mixtures to release the gas, have long said that the proces releases dangerous chemicals that contaminate groundwater. Other toxic chemicals and nitrates used in agriculture seem into the groundwater as well.



Throughout human history, water has been treated, and priced, as a public resource. But as it's scarcity grows, private interests are starting to eye the world's water supply as an increasingly profitable commodity. A basic example might be the company Nestle, who recently caught heat for buying the rights to small aquifers that communities depend on and draining them to resell the water in bottled form, paying exponentially cheaper prices than what residents were. This has rasied the age-old question of who has the rights to what water. But if water is public (and therefore free), there are no incentives to value it as we should. If water were financially worth something, perhaps we would not be using it in such absurdly wasteful ways. Too often what we pay for water doens't even cover the cost of transport. But if water were worth more, the price of everyday products would skyrocket, and the burden of this would be born by the poor.

"Water is the petroleum of the 21st century"
-Goldman Sachs

What about desalination?

we can only drink 3% of the wa- on Earth. Why not find a way access the other 97%? Drinking ight saltwater actually rapidly ydrates you. Desalination isn't thing new, it's actually been und for thousands of years. even mentioned in the Bible Exodus 15:22-26). Sailors did, still do, use it on longer voys. Earth does it all the time, r desalination of saltwater is ere rain comes from. The human ven process of boiling saline er to evaporate and remove the hwater is relied on by 1% of the world's population (Israel alone gets 50% of it's water from desalination plants), and that number is only growing. The UN estimates that by 2025 14% of the world's population will rely on desalination for their daily needs. The problem is, its just too expensive. Most of the cost comes from the energy required to run the plants. By some estimates you would need to transport water 2,000 km to equal the cost of desalinating it. At the moment, the technology does not exist to produce enough water in any kind of cost-efficient way.

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INFOGRAPHICS BY LOTTIE GIDAL AND NINA LAVEZZO-STECOPOLOUS

1 LB BEEF
9,000 LITERS

All products have some hidden amount of water, but nothing comes close to the amount of water used to produce meat. Cows eat alfalfa, which the US grows in the desert regions of California, who ships in over 2 trillion gallons of water a year from the Colorado River to grow the cattle feed. Americans are notorious for diets high in meat, and the rest of the world is starting to join in. But they can't–there simply isn't enough water. Just a year of a vegetarian diet is estimated to save 575,000 liters water. It's not that eating meat is inherently wasteful, Americans just tend to do it a lot more than is considered healthy. Cutting back even a little makes a big impact.

GLOBAL MEAT CONSUMPTION