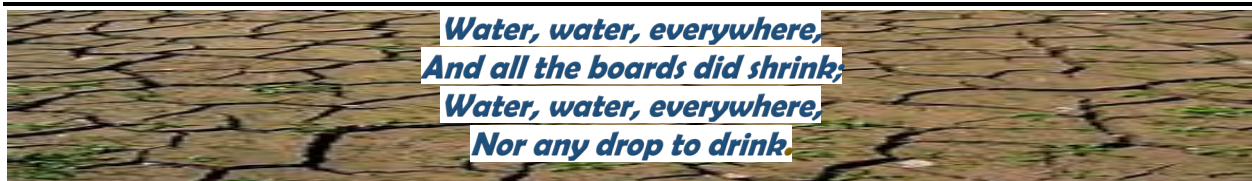




Water: Will we have enough after 2050?

(Please bring this to the attention of your students, vis-à-vis UN-SDG Goal #6, Clean Water and Sanitation as supported in our JHBC-PRME commitment to responsible management education in 2012).

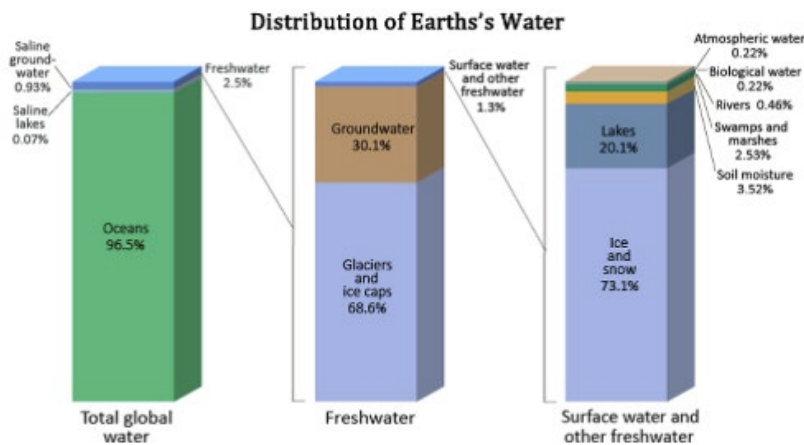


Samuel Taylor Coleridge 1798, "The Rime of the Ancient Mariner"

WATER LIMITATIONS ON A BLUE PLANET?: Looking at our planet from space, Neil Armstrong must have seen a planet that is blue--one that has more water than land (Image, Right: Hubble Telescope). Seventy percent of the earth's surface is covered with it. But, even as we know that planet earth contains 335,877,862 cubic miles of water, not all of it is **potable**. Ninety-seven percent of what water there is sea-water, but this water's salinity prevents it from sustaining life. We get 3% of fresh drinkable water from our rivers, fresh-water lakes, and underground **aquifers**. There is such a limited supply of fresh water, and yet we continue to deplete our stock through our propensity to pollute. But, to those who have not experienced shortages, it is hard to think of water as anything but a free and inexhaustible resource.



HUMANS ARE "WATERY" BEINGS: Human beings are composed of 60-70% of water. If a person loses 15% of their bodily water, they will die; and we also know that people cannot live more than seven days without water.



The U.N.s
Goal #6,
views water
scarcity as an
existential
problem, and
threatening to



our immediate future. It has embedded the issue into its 17 Sustainable Development Goals, #6—“*Clean Water and Sanitation*,” asking global communities to achieve strive towards this by 2030. Turn to pg. 8 for operational targets. (Paris Accords, 2015).

UNITED NATIONS’ VISION FOR WATER SUSTAINABILITY: The UN’s 2023 Water Conference – formally known as “the 2023 Conference for the Midterm Comprehensive Review of Implementation of the UN Decade for Action on Water and Sanitation (2018-2028)” – will in New York, 22-24 March 2023. The UN has declared the significance of global unity in preserving freshwater:

“Our watershed moment: uniting the world for water”.
Version 1 November 2021, U.N.

The United Nations Development Programme, produced a report in 2006, showing that in 2005, 700 million people (11% of the world’s population) lived under water stress with a per capita water supply below 1,700 m/year (Watkins, 2006)¹. Water insecurity is already present in the Middle East, North Africa, India and China. Greater than 3 billion people (or about 40% of the

THE UN DEVELOPMENT PROGRAMME STATISTICS, 2006

- 1 in 4 health care facilities lacks basic water services
- 3 in 10 people lack access to safely managed drinking water services and 6 in 10 people lack access to safely managed sanitation facilities.
- At least 892 million people continue to practice open defecation.
- Women and girls are responsible for water collection in 80 per cent of households without access to water on premises.
- Between 1990 and 2015, the proportion of the global population using an improved drinking water source has increased from 76 per cent to 90 per cent
- Water scarcity affects more than 40 per cent of the global population and is projected to rise. Over 1.7 billion people are currently living in river basins where water use exceeds recharge.
- 2.4 billion people lack access to basic sanitation services, such as toilets or latrines
- More than 80 per cent of wastewater resulting from human activities is discharged into rivers or sea without any pollution removal
- Each day, nearly 1,000 children die due to preventable water and sanitation-related diarrheal diseases
- Approximately 70 per cent of all water abstracted from rivers, lakes and aquifers is used for irrigation
- Floods and other water-related disasters account for 70 per cent of all deaths related to natural disasters

¹ Watkins, K. (2006) “Beyond Scarcity: Power, Poverty and the Global **Water** Crisis,” UNDP Human Development Reports

world's population) will live in water-stressed areas if we continue on the path of short-sighted goals. In support of **Goal #6**, the United Nations produced the preceding statistics.

“MNI WICHONI”–WATER IS LIFE:² Water exists on our planet in three macro areas: in the hydrosphere; which is water on the planet's surface; water is found under the planet's surface; and water is present above the planet's surface (Mulligan, p. 209, 2018)³. Water also appears in three natural formations—solid water, or ice; liquid water, that we find in oceans, rivers, lakes and stream; and water that evaporates into gas, and then ascends into the atmosphere. As it rises it gets cool, and condenses into rain or snow in clouds, and descends again to the surface as rainfall or snow. This process is known as the **water cycle** of the planet and it is responsible for earth's weather.



WHY IS THERE WATER INSECURITY ON THE BLUE PLANET? Although rivers and lakes are the most heavily used of our water resources, they represent only a tiny amount of the world's useable water. Consider this: If all the earth's water was just 1 gallon, then only 1 cup of that water would be available to us—yet it is not. Only 2 tablespoons of that water would be readily useable (Theis and Tomkin, pg. 151, 2013). Why is this the case? To understand why, we must look at the main stressors on water availability and quality.

Conflicts over water in the United States and around the world are very familiar to us. Fresh water is a common good—the property of all humanity. But communities will always claim proprietary rights over water. Within countries, unilateral actions by governments and the



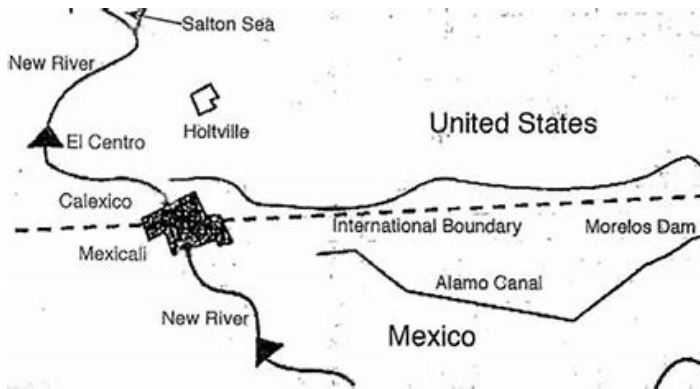
agricultural industry have changed river pathways in these countries and exacerbated regional tensions. Thus, damming of rivers for the benefit of special interests is commonplace, especially when a single river flows through several nations. This is the case of the Danube River in Europe, where quarrels between nations over water management, is pervasive. The Euphrates-Tigris Basin is shared between Turkey, Syria and Iraq. The dam in Ethiopia causes conflict between Egypt, Sudan and Ethiopia; and, led to the Darfur conflict. (Above: www.slideshare.net)

The Great Renaissance Dam in Ethiopia on the Nile River is another example of water wars between nations.

² The Lakota phrase “*Mni wičhóni*,” or “Water is life,” has become a new national protest anthem.

³ Mulligan, M. (2018) *An Introduction to Sustainability*” Routledge, N.Y.

Diversion of water into dams from lakes and inland seas, for commercial and agricultural purposes, are other causal factors in the scarcity of freshwater regionally. The Aral Sea in Kazakhstan, has been drying up because of diversion (Right: newsreadonline.com) This body of water can claim only about 10 percent of its former surface area of 26,300 square miles. Another example is Lake Chad in the nations of Chad/Niger/Nigeria/Cameroon, by diversion River Chari's waters. In 1926, Owens Lake covered about 108 square miles in California near the border with Nevada. But in 1913, the Los Angeles Department of Water and Power diverted the Owens River into the LA Aqueduct, creating on going tensions between Northern and Southern California. The most polluted rivers in the world are the Ganges River, Yellow River, Citarum River, Buriganga River, Yangtze River, Mississippi River, Sarno River, Jordan River, and the Nile River.



In the United States, the New River (River Neuvo) flows from Mexicali in the South to the United States through Calexico to the north, and ends up in the Salton Sea. It is known to many as *“the most polluted river in the world”*-- although other regions do share this same notoriety. Wastes from industrial plants, and agriculture, such as fertilizers, chemicals, and heavy metals, flow directly into the New River. The



13-mile industrial park in Mexicali is a major source, but human municipal waste, and animal excrement flow unchecked into the river, due to lack of proper municipal management of sewage and garbage treatment prior to dumping. (Image, Right: San Diego Union Tribune). The notorious New River has become so toxic that even the Border Patrol in the Port of Calexico will not go into



its dangerous waters to apprehend illegal immigrants. These people float in the river each night to their destinations in California and the rest of the United States. They carry the toxins with them to their worksites (such as into food service jobs) spreading disease. The river also pollutes the land on each side of the river, making it

uninhabitable and impacting people with a variety of diseases, from respiratory infections to cancers, and autism.⁴

INDUSTRIAL POLLUTION: Industry has polluted much of our sources of water. Poor municipal sewage treatment systems in many nations contribute to water pollution as well. Often untreated sewage and chemicals are dumped directly into water sources. On the left: chemical.news, shows DuPont dumping of chemical C8 into the Ohio) River. Health problems in societies arise from these unsanitary and toxic conditions. Most people do not connect water with their illnesses. The World Health Organization⁵ notes that 88% of people die of diarrhea as a result of lack of access to clean water. Other diseases, such as cholera, have increased around the globe by 130 percent due to sanitation.



WAR AS A WEAPON AGAINST WATER: War has always been a weapon that limits water sustainability. Just three days after the start of the latest invasion into



Ukraine in 2022, Russian forces smashed a dam in Ukraine's Kherson region which then blocked water access to Russian-annexed Crimea. In Mariupol, a city in southeastern Ukraine, Russian soldiers shut off local water supply as part of a ferocious siege on the



city, leaving the trapped population without access to safe drinking water or sanitation. Moscow has made a point of targeting water infrastructure — including pipes, sewage treatment plants and pumping stations — in air strikes across the entire country, according to Tobias von Lossow, a research fellow at Dutch think tank Clingendael.



On the left see effects of chemicals in war on water. (The Guardian). On the right: water—will it be the next global conflict? (The National Interest)



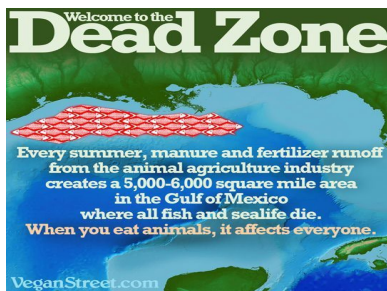
⁴ Environmental Laws in many of these regions exist—the problem arises with corruption and decoupling public need from private interests

⁵ World Health Organization, www.wto.otg

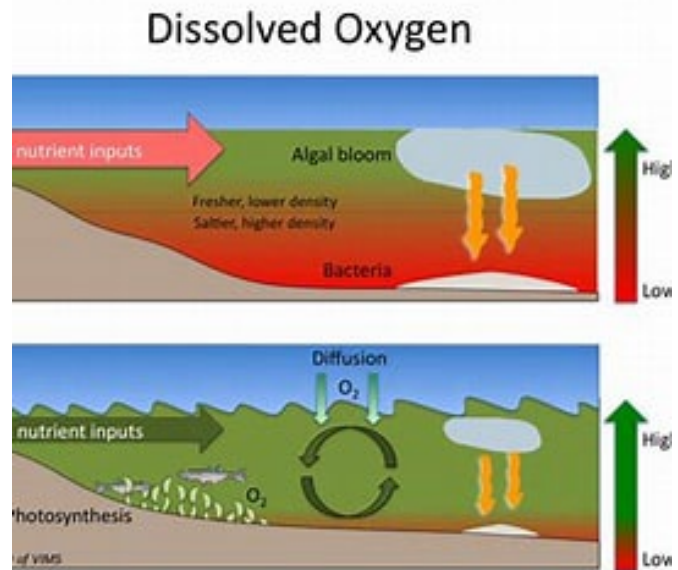
Other Top 10 Stats and Facts About Water Pollution

- 80% of the world’s wastewater is released back into the environment.
- 80% of trash in oceans comes from land-based sources.
- There are some **500 “dead zones”** where no living organism can exist.
- Oil spills only account for 12% of oil entering seas every year.
- Around one million seabirds die from ocean litter, statistics reveal.
- Almost 50% of plastic has been manufactured since 2000.
- Europe has a plastic recycling rate of 30% — the highest in the world.
- 90% of all plastic waste in oceans comes from just 10 rivers.
- 100,000 marine mammals die annually as a result of plastic pollution.
- Ingesting over 200 pieces of plastic equals certain death. (Source: “42 Upsetting Water Pollution Statistics (2022 UPDATE),” by [Ljubica Cvetkovska](#))

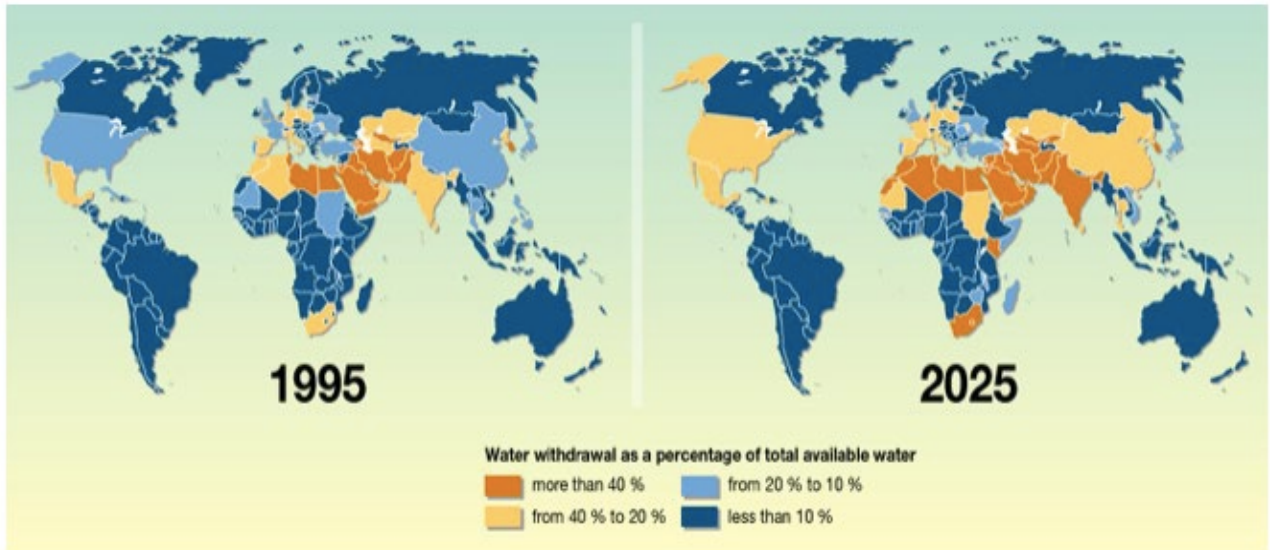
DEAD ZONES IN WATER: An image of one ubiquitous “**Dead Zone**” is shown below from the Gulf of Mexico. A “Dead Zone” is a more common term for *hypoxia*, which refers to a reduced level of oxygen in the water. Marine life cannot be sustained in these oceanic, and other dead zones. (The Virginia Institute of Marine life describes this phenomenon, see below right (vims.edu))



Above: dead marine life, photograph by David Marinelli .net

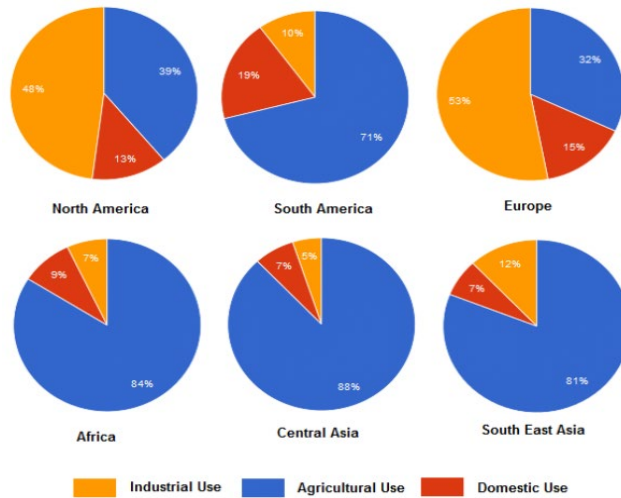


The U.N. has obtained pledges from nations to meet SDG goals, with marginal follow-through.



But where will we be in just three years from now? Below is a world map of water withdrawal .
(Source: researchgate.net)

Industry in North America can claim the biggest share of water pollution. (Below Source: www.testbig.com)



GLOBAL GOALS AND TARGETS FOR WATER BY 2030—U.N.:



- **6.1** By 2030, achieve universal and equitable access to safe and affordable drinking water for all
- **6.2** By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations
- **6.3** By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally
- **6.4** By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity
- **6.5** By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate
- **6.6** By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes
- **6.A** By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies
- **6.B** Support and strengthen the participation of local communities in improving water and sanitation management



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