

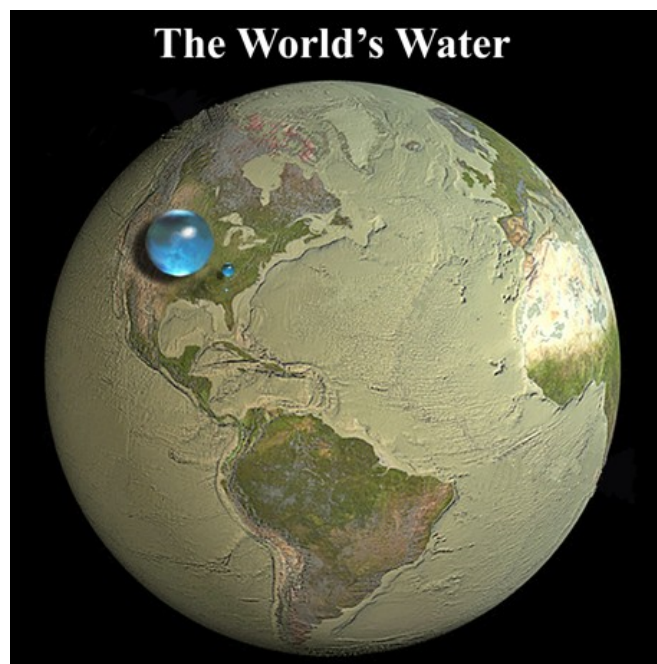
Magic Blue Droplet

I'm Grant Symons. I convene Transition Edge to help us understand how we can transition to a low carbon sustainable world using leading thinking and practices.

As far as we know, life cannot exist without water. It is a critical element required for the function of the cells that exist in all life forms. It is thought the water that exists on earth arrived from outer space in the form of asteroids and meteorites over 4 billion years ago.

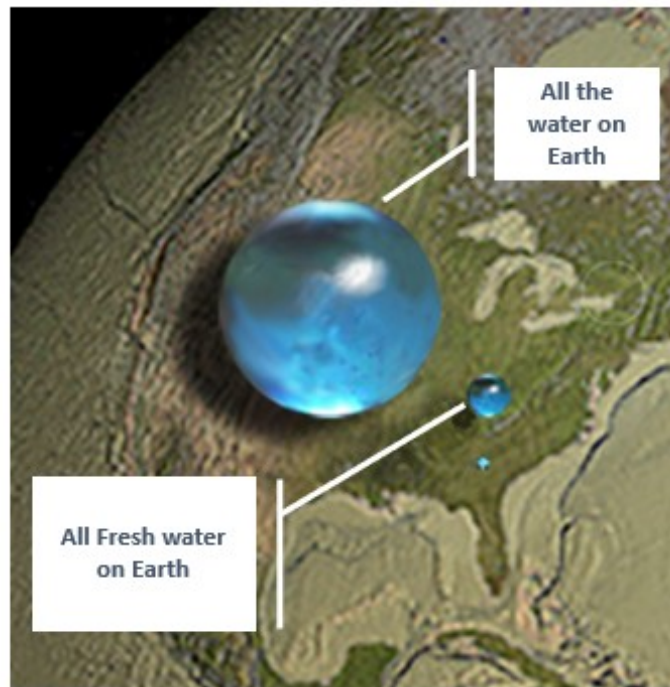
We call it our Blue planet because that is how it appears from outer space.

In 2013 the Woods Hole Oceanographic organisation produced the graphic below, that shows how much water there actually is on the planet in spherical shaped volume. We have the impression that we indeed live on a vast blue planet when in fact the water is literally just a thin film. And the incredible part is that this relatively small amount of water has given rise to all living things.



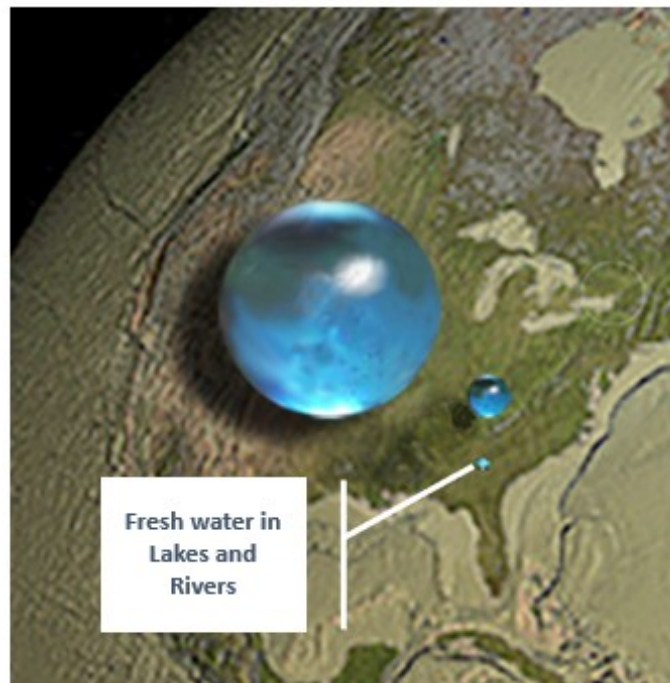
If you look hard, you might notice something else.

There is another sphere that we have magnified below that shows the amount of *fresh water* on earth. This includes all of the fresh water locked up in ice, rivers, lakes and subsoil. Again, it seems astonishing that there is such a small amount, considering much of it is distributed over the polar caps in the form of ice.



Now we zoom in even further on the tiny world of our Lakes and Rivers

Shown below, yes that tiny sphere that looks like a dot, is all of the fresh/non saline water flowing in our lakes and rivers across the globe. This relatively tiny sphere is what we have available for use by the 'human enterprise' **at any point in time**. According to Wikipedia this is about 1% of all water.



What seems astonishing is that such a tiny amount has given rise to so many living (and extinct) life forms and that it provides **so many services** we humans rely on today. It provides us with drinking water and activities including, electricity generation, industrial and agricultural processes, while at the same time being used to carry waste and pollution.

Water flows and cycles.

Those of us that live through floods and droughts know how devastating and precious water can be. And it flows and keeps flowing with gravity. It is never in one place for too long, one week we can have too much, and months later there isn't enough to go around.

Since the Woods-Hole graphic was produced approximately 10 years ago, the atmosphere has continued to warm, which has increased the amount of water in the atmosphere. In a recent presentation by James Renwick, professor of physical geography at Victoria university in Wellington, he made the following points:

- Evaporation works better in warmer conditions, causing the amount of moisture in the air to increase.
- Some geographies will get drier and hotter for longer, while others will get much wetter, when it rains.
- That approximately half of the worlds average rainfall occurs on 12 days of the year, but this will happen on fewer days as temperatures increase, meaning more 'deluge days'.

This is the increasing volatility that scientists have been warning of for decades and the lived experience of millions of people already.

And it is a major reason there is growing support for agricultural practices that enhance ground moisture retention, especially in drought prone regions and limit the damage to land and soil in deluge prone regions.

Ecosystem overshoot of rivers and lakes.

With the perspective of how little fresh water there is in our rivers and lakes it is concerning to understand the extent that we allow the ongoing disruption of them through industry, agriculture and land use alteration. There are futurists, scientists and those with lived experience that are pointing to a future in which water is not a source of life, but a source of misery.

The changing oceans.

As the atmosphere warms most of the heat is absorbed by the oceans. It is thought that due to the vast surface area and thermal conductivity of water, the oceans have already absorbed as much as 90% of the additional heat trapped within the atmosphere since preindustrial times.

So not only has the earths water been the mother of all life, but she is also the balancing force that goes largely unnoticed as we bungle our way into the future. The additional heat she now holds may cause changes in behaviour, with the dance between her and the sky evolving in new and possibly unexpected ways for thousands of years to come.

As the oceans warm, they tend to expand which adds to sea level rise along with ice melt. She is also absorbing additional carbon dioxide which increases acidity, and this has cascading effects on marine ecosystems.

The Mediterranean Sea is a real-life example of an ecosystem that is in rapid decline through acidity, overfishing and pollution, particularly micro plastics. The world watches on, because what emerges there has the potential to happen **in all seas**.

Measures to take.

- Reduce pollution - Our oceans and rivers cannot remain 'externalities' for the human enterprise. The amount of fresh-water available is tiny and overused already, with even the most well-intentioned efforts to reduce leaching and runoff unlikely to materially slow our impact. Local people know their rivers and catchments and should be having honest conversations about their protection and restoration.
- Protect wetlands, watersheds and floodplains - These areas are natural filters and buffers. Our uses of them ought to be in alignment with general ecosystem restoration and acceptance of emerging climatic changes. They are more effective carbon sinks than forestry.
- Water conservation - Fresh water is a finite resource. It is needed for essential life supporting activities and needs to be used efficiently. In future, the impacts of climate change and the human enterprise use of water are likely to be more contested.

Closing thoughts.

It seems incredible that this magic droplet found its way to this earth.

And that everything living has emerged from and within this thin film that coats the planet, as if life were painted on by an artist from the galaxy.

She is constantly on the move and everything living needs her, she is part of us and us of her. And the good news is that she is self-restoring and rebalancing in nature, if we make the effort.

By caring for her we care for everything, let's start with looking after the 1% a lot better and not heating up the 99% any further.

Having traversed the galaxy to get here she is capable of great tolerance, forgiveness, and sufferance. Far more than we will be able to endure.

This weeks quote -

“When the well's dry, we know the worth of water.”

– Benjamin Franklin