Insight summaries

Insight #7: Is there a water crisis on the blue planet?

Water is a miraculous substance – it occurs in abundance throughout the Universe, appearing within the first billion years after the Big Bang, is common across our Solar System, and of course on Earth, the Blue Planet.

The fundamental question of this Insight is whether our Blue Planet is suffering a water crisis today, seemingly inconceivable with 70% of the Earth's surface covered by water. Whilst ocean water is too salty to drink without treatment, the planet has large amounts of freshwater in its ice caps and mountain glaciers, as well as in rivers, wetlands, and groundwater.

However, humanity's relationship with water today is a complex one. Water is threaded through so many aspects of our world, firstly and foremost being essential for the creation, support and evolution of all living things. It also provides for drinking water, various domestic and industrial uses, sanitation and hygiene, food and energy, ecosystem services, recreation, social and spiritual benefits. Despite this, by and large, we don't manage our available water resources as well as we should.

The case for effectively managing water has never been stronger, to: achieve universal access to clean water and sanitation, provide needed clean energy and food, rebuild ecosystems,minimise conflicts, help control disease pandemics, reduce extreme poverty and tackle inequality.

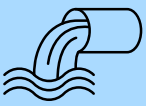
What constitutes a 'water crisis'?

To understand the meaning of a water crisis, a broader perspective on water is needed: one that recognises the critical importance of water to society; one that notes that water isn't always our friend, causing amongst the largest loss of human lives through natural disasters and the demise of several past civilisations; and one that understands how climate change is creating unprecedented risks to global water security and vulnerable communities.

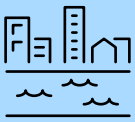
Using the definition of 'crisis' as a global or regional situation that needs an urgent response to avoid a much worse future outcome, we conclude that several water crises do exist. Four water crises are recognised as being global – climate change driven water impacts, aquatic biodiversity and ecosystem decline, water pollution, and the water consequences of unsustainable development.

Climate change, an existential risk for humanity, expresses most of its impacts on human societies and ecosystems through water, and hence creates a water crisis. Climate change is accelerating and every day we hear of more extreme floods, droughts, intense storms, cyclones, inundation from sea-level rise and storm surges, marine heatwaves, loss of corals and melting of the polar caps and glaciers. As global warming increases, the water cycle will be energised further, the cryosphere will melt more rapidly, tipping points will be crossed, and extreme climate-water events will pose even greater risks for humans and ecosystems.

An **aquatic biodiversity and ecosystem** crisis is evident from the dramatic decline of 83% of freshwater aquatic species populations, 80% loss of wetlands, widespread river degradation and a 50% decline in marine animal populations since 1970. This century there is potential for the total loss of tropical corals, with large consequences for biodiversity and communities dependent on coral systems. Driving this crisis are habitat destruction and degradation, modification of natural flow regimes, barriers to fish movement, exotic species invasions, overexploitation of water and organisms, water pollution, overfishing, coastal development, and high greenhouse gas emissions- all linked to human activities.



Water pollution is least in the most advanced economies due to the introduction of effective pollution controls on point sources, especially treatment of all human effluent and industrial wastes before safe disposal into water environments. Non-point source agricultural pollution has generally been more difficult to control. In least developed and many developing countries, most effluent and wastes are disposed to the environment untreated, posing great risks for downstream users. This ongoing pollution crisis has been supplemented by the global pollution of waterways and oceans from plastics and microplastics.



Unsustainable development, the fourth global water crisis, continues apace in most countries, skewing economic development massively in favour of humans and against other species, leaving the Earth's biosphere imperilled. Unbridled development has also occurred across parts of the water sector itself, exemplified by over-extraction of surface and groundwater, in-filling of wetlands, isolation and development on floodplains, and unrelenting dam construction causing river fragmentation and disturbed flow regimes.

Regional level water crises recognised include increasing water stress in towns, cities, catchments and remote communities; unsafe drinking water and unsafe sanitation in least developed and some developing countries; and increasing internal conflicts over access to water, and damage to water services and infrastructure in war zones.

Can we fix it?

Solutions to the water crises are available, but have been difficult to implement because of the massive adjustment required to the existing socio-economic paradigm. Much can be learnt from the importance water has played in both building past civilisations and contributing to their demise. Almost all early civilisations were established close to good water resources, but drought has been the predominant water-related contributor to the collapse of civilisations. The demise of once bustling societies is a reminder that even great civilisations can become fragile to impacts of climate variability, often enough to topple what seemed invincible.

Today global water management is diverse, with differences in the levels of sophistication. Advanced economies employ a wide range of methods to achieve a high degree of water security, perhaps with the exception of the environment. By contrast, in least developed countries, some developing countries and war-torn regions, water management is rudimentary, subsistence or survival focussed. Access to clean water is fraught, and treatment of wastewater minimal. In these countries there is a devastating loss of human life linked to poor water quality.

Despite the challenges, there is room for optimism in managing water crises, as exemplified by countries that have built high water security and restored some aquatic ecosystems. Furthermore, the United Nations has risen to the challenge with three crucial initiatives: Transforming our World: the 2030 Agenda for Sustainable Development; the Framework Convention on Climate Change; and the Convention on Biological Diversity, each formulating the actions needed for a better future. In terms of water, the United Nations is making progress with Sustainable Development Goal 6- Ensure availability and sustainable management of water and sanitation for all, although positive results are uneven, and a significant acceleration and increased funding is needed to achieve 2030 targets.

In summary

The world is facing multiple water crises, some global and some regional. On the positive side we have the know-how and tools to solve the water crises, have key global initiatives in place, and some inspiring success stories.

It remains to be seen if there is sufficient societal willpower to fully redress today's water crises and create a better future.

This summary was authored by Prof Nick Schofield. Please refer to Insight 7 for author details, caveat, references, further reading, and glossary. Design by Trish Dalby.