

WATER INNOVATION AND ECOLOGICAL TRANSFORMATION: entrepreneurial approaches to advancing sustainable solutions

Scott Bryan
President of Imagine H2O



As President of Imagine H2O, Scott is responsible for leading Imagine H2O in its mission. He initially volunteered with Imagine H2O's launch team in 2008 before joining as its first employee in 2010. Since then, Imagine H2O has supported over 150 startups and expanded its programming internationally. Scott serves on the National Alliance for Water Innovation's (NAWI) Innovation and Commercialization Council and is an advisor to the Environmental Policy Innovation Center. Prior to Imagine H2O, Scott developed ESG and cleantech investment strategies for institutional and private clients at Royal Bank of Canada and Piper Jaffray. He has a BA in Economics from Colorado College.

Imagine H2O is an accelerator that supports water startups with capacity-building, partnerships, mentorships and other resources so that water solutions can have an impact on equity, health, climate and resource availability at scale. This article outlines steps and considerations that are vital for entrepreneurs and intermediaries to understand if they wish to scale ecological transformation solutions.

INTRODUCTION

“Ecological transformation means adapting, improving, and prioritizing sustainable patterns of production and consumption. It means placing ecology at the forefront of our processes, solutions, and most importantly our mindset.”

Climate change and decades of water mismanagement have created a “three-headed” global water crisis.¹ People have contaminated water and depleted water sources, and human activity like deforestation and agriculture has altered rainfall patterns; we face the prospect of a 40% shortfall in freshwater supply by 2030. Meanwhile, climate change, water mismanagement and biodiversity loss interact to cause more frequent and severe episodes of too much or too little water, such as storms, floods, droughts, and wildfires.

Transforming water systems is of the utmost urgency for ecological transformation. We need clean water to be readily available and access to be equitable; we need to prevent unnecessary water loss; we need greater circularity for urban and industrial wastewater; and we need to reduce the footprint of industrial water use. According to Global Water Intelligence, 70% of climate adaptation costs will be in water in some way² – thus water will be at the center of a transition to a more resilient world.

However, transforming water requires not only innovative solutions and commercial scale, but also collaboration and integration with national, regional, and global governments and policies. At the same time, many solutions must be localized and sector-specific; solving a water challenge in one place does not necessarily contribute to solving water challenges globally. This is a key distinction between water and carbon, as GHG reductions, regardless of geography, will have a singular global impact.

Tomorrow's water solutions will undoubtedly be different than the solutions of the past. In short, we must decentralize, decarbonize, digitize, and democratize water management in ways we've never imagined before. Entrepreneurship and innovation can play a critical role in accelerating this transition.

¹ Mazzucato, M., N. Okonjo-Iweala, J. Rockström and T. Shanmugaratnam (2023), *Turning the Tide: A Call to Collective Action*, Global Commission on the Economics of Water, Paris.

² Global Water Intelligence. April 27, 2023. This year's Global Water Summit in numbers.



Epic Cleantec treatment center: A part of Imagine H2Os startup portfolio. Source: Epic Cleantec via Imagine H2O.

THE GROWING DEMAND FOR WATER INNOVATION (AND ACTION)

Historically, the relatively low cost of water has disincentivized action. This is changing as communities, businesses, and citizens begin to see the real costs and risks associated with inaction.

For example, insurers are becoming increasingly concerned about managing water risk from climate-related events. And a 2021 drought in Taiwan and the ensuing global shortage of microchips is just one reminder of the risks to private industry.³

Meanwhile, public consciousness is on the rise, particularly concerning issues like PFAS contamination in drinking water and combined sewer overflows. Armed with data and scientific knowledge, citizens are calling for action from utilities and businesses, which must now adopt novel solutions and approaches.

All of these factors collectively establish a compelling business case for water innovation, unlike anything we've witnessed before. If we delay action and investment, the costs and complexity of the path forward will only grow. We will need

to use even more energy to remediate and treat water sources that will become increasingly affected, directly and indirectly, by warming temperatures.

HOW IMAGINE H2O SUPPORTS WATER INNOVATION

Imagine H2O is a global nonprofit organization that envisions and builds solutions with the world's best water entrepreneurs. Since 2009, our startup accelerator programs have identified and supported over 200 startups. Collectively, our entrepreneurs have mobilized more than \$1 billion in early-stage investment and scaled their solutions to reach more than 1.1 billion people. Our model goes beyond the traditional tech accelerator approach to include pilot resources and funding enabling entrepreneurs to demonstrate their solutions in the communities and sectors in need of innovation. We work in four impact areas; climate, circularity & efficiency, health, and equity.

Our startup portfolio includes an array of solutions tackling our most pressing water challenges, while creating the business case for change.

³ Yang, Stephanie. April 16, 2021. *The Chip Shortage is Bad. Taiwan's Drought Threatens to Make It Worse*. Wall Street Journal. <https://www.wsj.com/articles/the-chip-shortage-is-bad-taiwans-drought-threatens-to-make-it-worse-11618565400>

DECARBONIZING THE WATER CYCLE

Historically, water has been viewed as an adaptation play for the future. As a result, water has often struggled to find its footing as an area for prioritization at climate events such as the COP. However, this is quickly changing as we need to both adapt our water systems to a changing climate and decarbonize this sector.

Globally, water utilities are estimated to collectively contribute 2% of the world's GHG emissions – a level similar to global shipping.⁴ Overall, some 80% of all wastewater is released into nature. The GHG emissions from this untreated sewage and sludge are thrice that of treated wastewater. At the same time, current wastewater treatment methods are energy-intensive, accounting for roughly 70% of the sector's emissions.⁵

A growing body of research and new technologies are making the case for carbon neutral, and in some cases positive, methods to treat wastewater.

Aquacycl's BioElectrochemical Treatment Technology (BETT), a modular, onsite wastewater treatment system is one such solution. BETT can mitigate up to 90% of greenhouse gas (GHG) emissions and is already doing so successfully at a PepsiCo facility in Fresno, California. The system is also creating a 30% reduction in costs – creating the business case for this novel approach.⁶

Methane, both naturally occurring in reservoirs and as a byproduct from wastewater management, represents another massive challenge and opportunity for innovation. BlueMethane, another Imagine H2O startup, is developing a technology billed as a "Dyson vacuum cleaner" that separates methane from water and permanently removes this harmful greenhouse gas.

TURNING WASTE TO VALUE

Water innovation also represents an important tool in turning waste to value across the water cycle, and new technologies are driving resource efficiency.

Gross-Wen Technologies' algae-based wastewater treatment solution recovers and reuses nitrogen and phosphorus to create a valuable algae byproduct. With a grant from Imagine H2O, Metropolitan Water Reclamation District of Greater Chicago's (MWRD's) Stickney Water Reclamation Plant is currently using this technology to offset carbon emissions through algae growth while creating a fertilizer byproduct that can be used on the region's farms.⁷

Climate change and decades of water mismanagement have created a "three-headed" global water crisis; [...] transforming water systems is of the utmost urgency for ecological transformation

Utilities are also tapping a new generation of technologies to tackle the issue of non-revenue water, or water that is 'lost' before reaching the customer. Many cities see non-revenue water rates as high as 40%, meaning that water treated and conveyed through energy-intensive processes and systems simply vanishes into the ecosystem. Detecting leaks and recapturing non-revenue water represents an important opportunity to create economic savings and lower carbon emissions. This host of new solutions ranges from Asterra's satellite-enabled tools, to Smarterra's AI-powered analytics platform, to WEGoT's real-time sensor being deployed in India's residential sector.

SAFEGUARDING OUR ECOSYSTEMS

Sustaining ecosystem health is a cornerstone of access to safe and reliable water supplies while also insulating communities from the most severe effects of climate change. But overuse and pollution are threatening the world's most significant groundwater supplies.

An emerging field of sensors and analytical tools can play an important role in monitoring ecosystem health and safeguarding resources.

For example, iFlux deploys real-time sensor networks to monitor groundwater flux and quality, enabling data-driven decision making for utilities, industrial users, and agricultural users. Meanwhile, Ecospears' emulsified zero-valent iron filtration process removes contaminants from freshwater resources, including

polyfluoroalkyl substances (PFAS), polychlorinated biphenyls (PCBs), and other toxins.

CHAMPIONING EQUITABLE OUTCOMES

Ecological transformation can only be successful if all populations can benefit from these new solutions, including underrepresented communities and emerging markets. Advancing equitable outcomes will often require business model innovations that reflect local needs.

Drinkwell's water ATMs in Bangladesh and India are one such example, providing underserved urban communities living "beyond the pipe" with access to safe water. The company combines arsenic removal technology with RFID-enabled payment cards and a microenterprise model. The result is a compelling alternative to current models in which organized crime taps municipal sources and provides arsenic-laden water at a higher price.

In North America, startups like BlueConduit and 120Water are helping communities and households identify lead and other heavy metals in their supplies. These companies leverage new analytic tools and software offerings to bring affordable solutions to communities that need them the most.

4 IWA. Dec 2, 2022. Net-Zero: Mapping the route to water utility decarbonization.

5 Global Water Intelligence. July 14, 2022. How do we fix wastewater's big carbon problem?

6 WaterTech Online. Oct 7, 2022. Case study: How PepsiCo reduced costs and addressed climate and water goals through onsite wastewater treatment.

7 MWRD.org Jan19, 2023. Pilot algae reactor at MWRD Stickney plant to test carbon offset, and nutrient recovery.

THINKING BEYOND WATER

Finally, we must also recognize that the biggest gains in water are sometimes outside water. For example, an estimated 40% of food in the United States goes to waste each year.⁸ Solving food waste, and realizing the associated water benefits, requires innovation in supply chains and consumer behavior. In other areas, removing water from manufacturing processes or cooling techniques could provide important breakthroughs.

SUPPORTING ENTREPRENEURIAL APPROACHES FOR ECOLOGICAL TRANSFORMATION

While entrepreneurship alone cannot solve our water challenges, it plays an important role in unlocking new business models and emerging technologies, or simply applying current technologies in a smarter way. Successful entrepreneurs identify and target critical market pain points where solutions create clear value, and quickly. However, water entrepreneurs often face an uphill battle as they validate their solutions and secure financing to scale their businesses.

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Imagine H2O offers a critical service to help more ideas get to a yes/no answer faster. Over the past five years, we've ramped up our pilot support resources to help entrepreneurs secure and finance their pilots. We've provided \$2 million in pilot funding through programs like our Urban Water Challenge, the Water Technology Access Partnership with the World Bank, and Accelerating Innovation and Digitalization with the Asian Development Bank.

But innovation is not only about entrepreneurs. It's also about the intrapreneurs within water utilities and businesses who are willing to pilot new solutions. Entrepreneurship and intrapreneurship can play a critical role in challenging the status quo and rethinking business models to bring about the mindset change we need for ecological transformation. We've also partnered with leaders like Veolia to help promising entrepreneurs secure pilots in both the industrial and municipal sectors.

Businesses, utilities, policymakers, and other key actors must identify common challenges, embrace new solutions, and join forces to advance water innovation. The ripple effects of innovation and entrepreneurship include equitable access to clean water and sanitation for all; addressing climate change; protecting ecosystems and natural resources; and generating economic opportunities – contributing to a just and inclusive ecological transformation.

8 FeedingAmerica.org



Drinkwell filtration technology supporting its local community members. Source: Drinkwell via Imagine H2O.