

OCTOBER 2023

COMPASS

THE GLOBAL VOICE OF PROFESSIONAL FUTURISTS

**WATER
AND
FUTURES**



**ASSOCIATION OF
PROFESSIONAL
FUTURISTS**



COMPASS

Compass Magazine OCTOBER 2023

Compass is published by the Association of Professional Futurists under a Creative Commons License, unless stated explicitly otherwise. Some rights reserved.

About Compass

Compass magazine strives to be the global voice of futurists and foresight practitioners. As an official publication of the APF, our mission is to bring out the voices of foresight professionals of all ages and all backgrounds to create opportunities to advance the foresight profession and enhance the knowledge, wisdom and insight of our members, who serve as ambassadors for the profession wherever they are.

Editorial Staff

Editor: Stephen Dupont, U.S.
Design Director: Harmanjot Kaur, Canada
Career Columnist: Tracey Follows
Advisor: Richard Slaughter, Australia
Advisor: Patricia Lustig, United Kingdom

Contributors to this issue:

Stephen Aguilar-Millan, Heba Alhadyian, Mathias Behn Bjørnhof, Kiran Carpenter, Zan Chandler, Catherine Cosgrove, Seren Dalkiran, Tracey Follows, Kody George, Bob Israel, Stephanie Joly, Samista Jugwanth, Chris Jones, Matthew Klein, Riel Miller, JT Mudge, Jim Murray, Aldré Nel, Graham Norris, Stefan Pike, Richard Slaughter, Laurie Smith, Simeon Spearman, Jill Storey, Tamarah Usher, and Dmitriy Zakharov.

Contribute Articles to Compass

To contribute an article to Compass, please contact the editor or a member of the APF board of directors. For the next issue of Compass, submit article ideas to Stephen Dupont at stephen.dupont@pockethercules.com

Writer's Guidelines: Compass seeks articles that are 750 to 1,500 words in length. Submit articles, written in English, in a Word document, along with a short bio and a photo of the author. The editor of Compass reserves the right to edit all articles for grammar and length.

Association of Professional Futurists

www.apf.org

Officers:

Chair: Shermon Cruz, Philippines
Vice-Chair: Tanja Schindler, Germany
Treasurer: Laura Schlehuber, USA

Directors at Large:

Modafar Akhoirshieda, UAE
Zan Chandler, Canada
Stephen Dupont, USA
Maggie Greyson, Canada
Mauricio Hernandez, Mexico
Miguel Jiménez, Spain
Maya Van Leemput, Ph.D., Belgium
Patricia Lustig, UK
Steve Tighe, Australia

CONTENTS

8 *EDITOR'S NOTES*

Stephen Dupont

WATER AND FUTURES

13 *FUTURES OF WATER: APPLYING FORESIGHT TO SOCIETY'S RELATIONSHIP WITH WATER*

Matthew Klein

20 *UNFROZEN NORTH: THAWING ARCTIC CIRCLE CAP CREATES INTERESTING POSSIBILITIES*

Stephen Aguilar-Millan

26 *THE RIPPLE EFFECT: HUMANITY'S EVOLVING DANCE WITH WATER*

Tamarah Usher and Kiran Carpenter

36 *HOW TO MODEL A CITY'S FUTURE WATER DEMAND*

Samista Jugwanth, Stefan Pike and Aldré Nel

46 *FORESIGHT CAN PLAY CRITICAL ROLE IN GLOBAL WATER RESOURCE MANAGEMENT*

Catherine Cosgrove

58 *MANAGING CO₂ IN OUR OCEANS: THE GREATEST CHALLENGE OF OUR TIME*

Jill Storey

64 *THE FUTURE OF WATER IN OUTER SPACE AND WHAT IT MEANS FOR FUTURISTS*

Kody George

71 ***INTO THE ABYSS: THE
CONTROVERSIAL QUEST FOR A
GREEN TRANSITION AT THE
BOTTOM OF THE SEA***

Mathias Behn Bjørnhof

80 ***A STEEP CHALLENGE: BUILDING A
MORE POSITIVE, SUSTAINABLE
FUTURE FOR OUR OCEAN'S
FISHERIES***

JT Mudge and Stephanie Joly

88 ***BLUE-GREEN INFRASTRUCTURE
THE FIRST STEP TOWARD BETTER
MANAGING WATER RESOURCES***

Stephen Dupont

99 ***MANAGING OUR RETREAT FROM
TOO MUCH WATER AND TOO
LITTLE***

Dmitriy Zakharov

105 ***THE IMPACT OF SNOW ON
MANAGING WATER RESOURCES***

Stephen Dupont

WORLD OF FORESIGHT

116 ***IN FOR THE LONG HAUL: HOW
TO HELP GOVERNMENT ACT
MORE LONG-TERM***

Laurie Smith

122 ***NORMALIZING POLYCRISIS***

Chris Jones

129 ***PSYCHOLOGICAL CHALLENGES
OF FUTURES THINKING***

Graham Norris





- 135** *PROFILE: JOANNA LEPORE ON FORESIGHT AT MCDONALD'S*
Stephen Dupont
- 144** *THE FUTURE OF YOU: YOUR QUESTIONS ABOUT CAREERS IN FUTURES*
Tracey Follows
- 147** *FUTURES LITERACY: IMAGINING AN ALTERNATIVE TO OBEDIENCE AND AUTHORITY*
Riel Miller

- 153** *THE MAN WHO DREW TOMORROW: EXPLORING THE FUTURE THROUGH DAN DARE*
Richard A. Slaughter

- 160** *MEET YOUR APF LEADERS: Q&A WITH ZAN CHANDLER*
- 165** *EXPLORING IMAGES OF THE FUTURE ON TVTROPES.ORG*
Simeon Spearman

- 174** *SHOOTING FOR THE STARS: NEW PARADIGMS AND THE ROLE OF NEXTGEN LEADERS IN NAVIGATING THE FUTURE*
Dr. Seren Dalkiran

- 184** *WHAT'S NEW IN THE FUTUREPOD?*

BOOKS AND MEDIA

- 187** *THE FUTURES EFFECT*
Jim Murray
- 190** *CLOSING THE LOOP: SYSTEMS THINKING FOR DESIGNERS*
Heba Alhadyian

COVER PHOTO CREDIT:
BOB ISRAEL,

<https://www.bobisraelphotography.com>

EDITOR'S NOTES

OCTOBER 2023

Water runs through the story of my life. I grew up on a lake. My wife and I own a cabin on a lake in northern Wisconsin. I love fishing for muskies and bass in freshwater and tarpon and redfish in saltwater. One of the most sacred places in the world to me are Lake of the Woods and Lake Superior. I love to downhill ski at places like Alta, Vail and Breckenridge. I love riding my fat-tire bike through snow during the winter. I grew up playing pick-up hockey with the neighborhood kids at the local ice rink. And one of my most treasured memories is walking the beaches of Sanibel Island in Florida picking up seashells with my wife and daughters.

But my appreciation for water took a turn two years ago when, representing a major engineering firm based in the Upper Midwest of the U.S., I had the opportunity to interview a pair of water operators who oversee the water plants for two small towns in Minnesota.

These two small towns rely on these older men to ensure that their water is safe and available to irrigate their crops and water their livestock. And if both towns had not raised the funds to pay for new water



Stephen Dupont

towers and new water plants, it's safe to say that those towns would eventually fade away.

When I asked them, "What's the future of water operators – people like you?" They both replied, "I don't see many young people who dream of being water operators."

In this issue, our cover theme is Water and Futures. As I edited the articles for this issue, it became crystal clear that there so many facets of this topic that we could explore that we could fill many issues with articles and insight.

Considering the importance of water to so many different systems, it is a topic that we will continue to visit in future issues of Compass.

In the meantime, this issue offers a number of compelling articles on issues and topics such as commercial fishing, removing CO2 from our oceans, deep sea drilling and managed retreat. As professional futurists, I invite you to carefully read through these articles and weigh these perspectives in your own foresight work.

ADDITIONAL READING:

I am trying to learn more about water issues. If you're interested, too, here are a couple resources to consider:

Book: *The Big Necessity: The Unmentionable World of Human Waste and Why It Matters*, by Rose George.

Book: *The Big Thirst: The Secret Life and Turbulent Future of Water* by Charles Fishman.

Magazine: *Open Rivers Journal*, published through the University of Minnesota.
Link: <https://openrivers.lib.umn.edu>.

APF CELEBRATES 20TH ANNIVERSARY IN WASHINGTON, D.C.

I had the opportunity to participate in the Association of Professional Futurists' recent 20th Anniversary event conducted in Washington D.C.

The three-day event, which attracted 57 professional futurists from around the world, focused on the theme of "Futures of Emerging Technologies and Governance Models." The event included a number of panel discussions

addressing Artificial intelligence governance, emerging technology trends, and national and global trends, which served as platforms for the participants to riff in open space ideation sessions.

The event included a handful of Little Bigs presentations, where individuals shared 5-minute presentations on their recent work. Topics covered included wave theory and its relationship to stock market forecasting, the future of purging one's home belongings, and most common tropes in science fiction books, movies and TV shows.



Images of APF ccelebration in Washington



IMAGE CREDITS: BOB ISRAEL AT
[HTTPS://WWW.BOBISRAELPHOTOGRAPHY.COM](https://www.bobisraelphotography.com)

On Sunday morning, Peter Bishop, supported by other long-time APF members, shared the history about the founding the APF, which led to an open ideation session about the future of futures and the future of the APF. A number of interesting ideas were generated, which will be used by APF leadership in developing a three-year strategic plan. Shermon Cruz (Philippines), the current chair of the APF, and Tanja Schindler (Germany), the vice-chair of the APF, attended the conference, along with several current board members.

Many thanks to Christian Crews, Jillian Humphreys, Travis Kupp, and Peter Bishop for organizing this very informative event that brought together members of APF community.

THANK YOU!

I would like to thank all of our contributors who took the time out of their busy schedules to contribute articles to Compass. The APF is about advancing the professionalism of the futures profession. And that involves sharing information with one another. Your contributions elevate our thinking as well as our profession.


I also would like to recognize my partner in making Compass come to life with each issue – Harmanjot Kaur, design director for Compass. Thank you again Harman for your incredible design work on this issue.

And of course, thank you to you, our readers. We hope you find Compass of value to your work and your career.

I would also like to thank Bob Israel who contributed the photo for the cover of this issue. Bob is an international landscape, travel and fine art photographer from Minneapolis, Minnesota. Over the years his images have been published in several landscape magazines including National Geographic Traveler, Capture Minnesota, Capture Wisconsin and most recently, America the Beautiful, a National Geographic photo book. Drawn to the environment, Bob has spent his career as a sustainability leader in several corporations with the most recent being The Sherwin-Williams company where he established their current sustainability platform and long-range carbon reduction goals. To more of Bob's work, visit bobisraelphotography.com.



Bob Israel




WATER AND FUTURES

FUTURES OF WATER: APPLYING FORESIGHT TO SOCIETY'S RELATIONSHIP WITH WATER

Matthew Klein



Image source: Canva



Water is woven into the fabric of every society on our planet. It is the fulcrum of cultural and economic development. Steven Solomon's *Water: The Epic Struggle for Wealth, Power, and Civilization* offers a vast accounting of water's historical relationship to and influence upon social change.

Although more than 70% of the Earth's surface is composed of water, it is also found in the air we breathe (as water vapor) and in the ground beneath our feet (as ground water). However, water is often hidden in plain sight. As Charles Fishman observes in *The Big Thirst: The Secret Life and Turbulent Future of Water*, water is more ubiquitous than we may imagine -- it is embedded within the clothes we wear, the food we eat, the computers and phones we use, and the homes in which we live.

Water presents futurists with innumerable dimensions for consideration. It faces its own set of social, technological, economic, environmental, political, legal, and ethical challenges and opportunities.

Additionally, water is connected to a range of drivers and a multitude of both weak and strong signals of change. Water possesses many qualities, but immunity to social change is not one of them. It will remain both a vehicle for, and victim of, social change.

Image source: Canva

PERSPECTIVES ON THE FUTURES OF WATER

The possible futures of water likely means many things to many people. It can be assessed at a personal, practical level as we drink water, flush toilets, and complain about high water bills (due to the showering habits of teenagers). Additionally, there exist certain moral, ethical, or worldview aspects for consideration (e.g., water as a commodity, human rights). For example, should I water my lawn or garden when there is a drought? Finally, from the economic perspective, an individual may invest in stocks, bonds, or mutual funds where water is considered as part of an environmental, social, and governance (ESG) framework. Individuals will continue to shape their own relationship with water.

At an organizational or institutional level, water is a significant area of consideration for corporations, governmental entities, and non-profits. For example, water is essential for the manufacturing, energy, construction, and agricultural sectors. The agricultural sector remains focused on water supply to ensure crops and livestock remain viable.

The energy sector, especially coal-fired power plants, require tremendous amounts of non-contact cooling water. The rise of alternative energy, including solar and wind, presents new challenges connected to the use of water in the extraction of the critical minerals used to manufacture innovative components. These challenges are extended to the development and use of electric vehicles. Entrepreneurs and other innovators continue to develop new software,


hardware, or other solutions to address a range of current or future water challenges, including the treatment of drinking water and wastewater (i.e., the removal of PFAS).

Water also fuels legal and political considerations, including legislative or judicial action addressing water quality, water rights (in the American West), the permitting and inspection of private and public water utilities, and the expenditure of public funds (e.g., loans and grants) for water-related infrastructure. Government agencies often find themselves immersed in conflicts between utilities, customers, and other parties (e.g., permit appeals and rate cases). Similarly, non-profits advocate for various water-focused legislative, judicial, or policy outcomes (e.g., the protection of wetlands, adoption of innovative technologies). Uniquely, non-profit organizations are recognized as significant drivers of social change in the world of water, especially the connection of environmental justice, human rights, and access to water and sanitation services within communities of color (e.g., Water for People, DigDeep, Water Mission)

THE FUTURES OF WATER AND UTILITIES

It is useful to focus on the futures of water by examining the ubiquitous drinking water and wastewater utility.

Clearly, technological change continues to influence the world of water, especially utilities. From advanced metering infrastructure and nanoscale sensors to new and innovative treatment technologies, water utilities are (slowly) pivoting from analog to digital.



Also, water continues to receive greater legislative, regulatory, and judicial attention at the federal and state levels. The paradigm of environmental justice — a weak signal in the 1980s — is now manifested through multiple legislative and policy activities directed at drinking water and wastewater systems, not merely hazardous waste sites.

Many public drinking water and wastewater systems continue to face financial challenges. Although some public funds are available and dedicated to shoring up these public systems, private water systems (with substantial capital) may continue to advance their acquisition (and rehabilitation) of aging public water systems.

Finally, the workforce is aging too. Environmental and economic regulators who helped establish many of the regulatory and policy systems (e.g., Safe Drinking Water Act, Clean Water Act) governing public and private water systems are retiring. More importantly, the operators of drinking water and wastewater systems are retiring. This concerning trend is especially hitting small towns and cities hard. Who will replace these workers (and what worldview(s) will the successors possess)? These changes will bring many opportunities and risks to drinking water and wastewater utilities and those with a relationship to these organizations.

Image source: Canva

SIGNALS OF TECHNOLOGICAL CHANGE: TRANSFORMATION OR BUSINESS-AS-USUAL?

Several dimensions of change (across multiple horizons) are worth highlighting to demonstrate the depth of how water is fundamental to and interconnected with the future. However, we'll focus on technological change.

Technology will continue to play an outsized role in the future of water, especially when considering the pervasive role of drinking water and wastewater utilities.

For example, one can imagine a future where drinking water and wastewater utilities operate seamlessly with multi-parameter nanoscale sensors, artificial intelligence, and other innovations. Advanced analytics automatically identify the need to repair or replace inefficient motors and predict the failure of water infrastructure (before the water main unexpectedly erupts in time for your commute). The supplies and other resources required by utilities (i.e., energy, chemicals, pipes, meters, hydrants) will be interconnected to a real-time, predictive supply chain system. To address water supply challenges heightened by droughts, treated effluent from wastewater utilities will serve as sources of supply for drinking water utilities as opposed to separate, siloed systems.

Similarly, customers will also see the outcomes from the advances of technology. With innovations in metering, appliances, and other devices, customers will be able to not only receive (near) real-time water consumption and billing

information, but other critical water quality data (e.g., drinking water contamination alerts). Specifically, customers will have access to “beyond the meter” components enabling greater control over their use (or non-use) of water.

Finally, government regulators will realize certain advantages. For example, environmental, operational, and financial data generated by utilities will be available in real time to government regulators. Non-compliance events will be immediately recognized and addressed. Financial, operational, customer service, and other data (central to private water utility rate cases) will enable shorter timeframes for securing rate increases from public utility commissions.



Image source: Canva

However, a business-as-usual scenario may be the future of drinking water and wastewater utilities.

Broadly speaking, drinking water and wastewater utilities (largely governmental entities) possess an organizational culture that is hierarchical and very slow to change. In short, they are organizationally reactive and tactical. The promise of technological change is also its challenge. Drinking water and wastewater utilities — as essential social institutions — are wedded to an ethic of predictability and consistency. When it comes to providing safe and abundant supplies of water, there is no room for error. Risks are to be avoided or mitigated. Wastewater must be properly treated and returned to the environment. Innovation presents risks — often unacceptable risks — to the world of water. No public official wants to become a “former public official” because of the failed deployment of a technological innovation.

MOLITOR AND MEADOWS: ESSENTIAL FOR THE FUTURES OF WATER

As we think about the futures of water, consider both Molitor’s *Model of Change* and Meadows’ *Leverage Points: Places to Intervene in a System*.

Engaging in horizon scanning to observe signals of change is fundamental. As discussed above, recognizing signals of change in relationship to water (especially in connection with utilities and technological change) is necessary. Nonetheless, both Molitor and Meadows offer helpful frameworks to assess the unique stages of change and transformation.

For example, one might criticize drinking water and wastewater utilities for only seeking out environmental and technological signals of change. For utilities (and other organizations), both the Molitor and Meadows frameworks can be used to expand the anticipation, framing, and shaping of the nature, form, and timing of social change (i.e., both opportunities and risks).

WATER: MORE THAN UTILITIES AND TECHNOLOGICAL CHANGE

The futures of water can be considered across multiple dimensions. Drinking water and wastewater utilities provide a familiar vehicle for discussion. Additionally, the consideration of technological change captures our imagination and harnesses our visions of a better future for water, in particular, and society, in general.

Beyond utilities and technological change, consider the following futures of water:

- With changing worldviews, what happens when water is treated not as a commodity or resource, but as a deity (with “human rights”) to be worshipped and protected?
- What happens when the government nationalizes all private drinking water and wastewater utilities?
- Who will decide whether (and how) water can be owned or used on other planets?
- What is the future of privacy and water with the advent of the internet of things and “smart everything” (i.e., surveillance capitalism)?

- Will the consumption of water during a drought lower a person's social credit score jeopardizing their ability to have further access to drinking water?
- In what ways may water serve either as a vehicle for peace or an object of war (e.g., dams or cyberattacks)?
- What happens when Western water rights "go away"?
- Will traditional drinking water and wastewater utilities become obsolete?



Dr. Matthew Klein

Water is life. It is the often-surreptitious thread that binds us together. The discipline of foresight presents multiple opportunities to imagine the futures of water.

Editor's note to readers: Interested in learning more about the futures of water? Check out Matthew Klein's Water Foresight Podcast [here](#).

Here are three non-profits focusing on water that the author invites the reader to explore further:

- Water for People - [Clean Water Around the World | Water For People](#)
- DigDeep - [DIGDEEP](#)
- Water Mission - [Clean Water Charity & Nonprofit Engineering | Water Mission](#)

Dr. Matthew Klein is the CEO & Chief Futurist of the Aqualaurus Group and is the host of the Water Foresight Podcast. He is a Senior Fellow with the Sagamore Institute and is a member of the Association of Professional Futurists, American Water Works Association, Water Environment Federation, and American Bar Association.

UNFROZEN NORTH: THAWING ARCTIC CIRCLE CAP CREATES INTERESTING POSSIBILITIES

By Stephen Aguilar-Millan



Image source: Canva

When thinking about water in a futures context, it is tempting to focus on a potential shortage of potable water. This is an important issue. However, there are some cases where there could be too much water rather than too little.

One such case could well be the Arctic. The onset of climate change is leading to the retreat of the Arctic Polar ice cap and to speculation that the Arctic Ocean could be ice free by the middle of this century. This prospect should command the attention of the futures community because it is likely to have profound consequences for global geopolitics and the global economy.

In applying futures thinking to the question of the Unfrozen North, several questions present themselves. What are the possible outcomes for the Arctic? How might we group these outcomes? What is the pathway from the present into that emergent future? And what does it look like when we get there? We shall address each of these questions in turn.

The possible outcomes for the Arctic relate to the potential future use of the Arctic as a geographical space. At present, owing to the ice cover and the relatively inhospitable climate, the Arctic, whilst being of significant environmental importance, has very little commercial and geopolitical value. However, we know:

- There are significant hydrocarbon and mineral deposits in the Arctic region.
- The Arctic has the potential to become a significant fishery, especially as fish stocks start to migrate northwards because of rising sea temperatures,

- The Arctic also has the potential to become a major shipping route between East Asia and the North Atlantic shores of America and Europe, and
- The Arctic could become another tourism destination, similar to the Antarctic.

At present, the Arctic Polar ice cap prevents the commercial exploitation of these factors. In the relatively ice-free Arctic Ocean of this emergent future, that has the potential to change.

The potential for the commercial exploitation of the Arctic brings into sharp focus the question of who has jurisdiction over the region. It may be felt that the national boundaries of the Arctic region are fairly settled, but that is not quite the case. There are potential disputes between all Arctic nations about exactly where the national boundaries lie. Another complication -- several of the Arctic nations (U.S., Canada, Norway, Finland) that belong to NATO on the one hand, and Russia, on the other hand, does not. The United Nations and the Arctic Council have attempted to bring a degree of certainty to these boundary issues but has failed to do so. On top of this lies a further complication that the Polar Ice Cap is not melting at an equal rate. Owing to a combination of winds, tides, and currents, the Polar ice is melting at a faster rate on the Russian shore than it is melting on the Canadian shore. This means that the potential for commercial exploitation of the Arctic will come to Russia sooner than for other Arctic nations.



Image source: Canva

The APF's Emerging Fellows program for 2020 contained a focus upon the Arctic as a region of geopolitical interest[1]. The program participants developed four broad groups of future outcomes, which included:

White Arctic: Owing to a combination of winds, tides, and currents, the Arctic fails to become ice free for a significant part of the year. Although the Polar Ice cap melts back, the Arctic Ocean fails to become navigable to commercial shipping owing to residual ice flows. We dubbed this the 'White Arctic', which we saw as possible, but unlikely.

Blue Arctic: The Arctic Ocean becomes commercially navigable for large parts of the year. In this case, the Arctic Ocean would become open to commercial exploitation of the hydrocarbon and mineral deposits, the harvesting of fish stocks, and the use of the region as a commercial shipping route. In this scenario cluster – which we dubbed the 'Blue Arctic' – there was something of a commercial free-for-all as the virgin territory of the Arctic comes to acquire a commercial significance.

Red Arctic: It would be difficult for the Blue Arctic scenario to act as an end point. The release of the commercial potential for the Arctic is unlikely to be the final position because the question of territoriality is then likely to arise. The Arctic is currently used as a form of global commons that is dedicated to environmental conservation and scientific research. In the face of increasing commercial value to the territory, it is quite likely that the Arctic would be enclosed under the jurisdiction of the Arctic nations, who could gain

substantially from these enclosures. Such enclosures, and their commercial exploitation would give rise to a further cluster of scenarios that we dubbed as the 'Red Arctic'. In this scenario cluster, normal geopolitical rivalry continues, only at more northerly latitudes.

Green Arctic: It is always possible, however, that a degree of consensus emerges about the future use of the Arctic, where it continues to be administered as a global commons, with sympathetic development that preserves as much of the environmental integrity of the region as possible that is consistent with a degree of commercial exploitation. We dubbed this cluster of scenarios as the 'Green Arctic,' which would be managed by a supra-national body – the current Arctic Council being a first step – on behalf of humanity. In these scenarios environmental conservation would be balanced with a degree of commercial exploitation.



Image source: Canva

At this point in time, all four scenario clusters – the White, Blue, Red, and Green Arctic – are distinct possibilities. In terms of likelihood, the Emerging Fellows felt that the Blue Arctic was a strong candidate to become the eventual outcome, simply because there is evidence of that eventual pathway starting to happen already. From the perspective of [EUFO](#) (European Futures Observatory), we decided to embrace that pathway and to conduct additional research into how that might come about.

We used a matrix game as our research technique to explore the pathway to the Blue Arctic between 2020 and 2050[2]. Matrix games are a useful technique because they allow the construction of an opposed futures narrative. The game provides a means by which opposing views can be blended to provide a story of an emergent future and which captures the tension of conflicting positions. The results of the exercise proved to be quite interesting.

Owing to the uneven melt rate of the Polar Ice Cap, the advantage of the Blue Arctic went to Russia at an early stage. Supported by China, Japan, and the East Asian nations, the Russian Arctic coastline soon became a key source of hydrocarbons and minerals, an important fishery was developed, and port facilities had been constructed along the Russian Arctic coast.

In the game, Canada was hampered by a lack of ready access to blue water as the ice melted from the Canadian Arctic coastline at a slower rate. Canada and Europe were more sympathetic to environmental concerns, but powerless to

prevent an assertive Russia, backed by East Asian capital, from exploiting the Arctic to the full. The United States was not really engaged with the Arctic as an issue as other concerns, such as a succession of fiscal crises, dominated the US policy agenda. By the end of the game, the Arctic Ocean was something of a Russian lake, dominated by both the Russian and Chinese navies.

This outcome – pretty much a baseline scenario for the Blue Arctic – presented a bit of a concern. As a response to this, we were commissioned – originally under the Horizon Europe programme – to examine what would be needed to ensure a Green Arctic scenario outcome[3]. We explored this possibility through the device of a committee game, with matrix arguments, in a bid to use opposed arguments to reach a consensus outcome. Unfortunately, we couldn't find a solution to the tragedy of the commons. This was an interesting result because it pointed policy away from the Green Arctic set of outcomes and hinted that prudent policy formation would be to prepare for a Red Arctic set of outcomes.

It is fair to say that the onset of disruptive climate change is changing global geopolitics and the global economy in ways that we are only now starting to appreciate. We cannot be fully certain of

the impact of an unfrozen High North, largely because it is outside of our previous experience. We can, however, speculate about the possibilities and establish a set of milestones to indicate which possibility is likely to dominate.

So far, the evidence suggests that a Blue Arctic is more likely than a White Arctic. In the event of a Blue Arctic, a Red Arctic is more likely to predominate over a Green Arctic because the pathway so far suggests a greater degree of territoriality and a lack of international consensus over the use of an unfrozen Arctic Ocean. This is a conclusion that is not fixed, but it will require a degree of international co-operation that is rarely seen if the Red Arctic is to be avoided.

[1] For a more detailed view of the research undertaken, see Aguilar-Millan SJ (Ed.) 'Our Geopolitical Futures 2050' (2021 Design By Accident Press). The work is available exclusively on Amazon at <https://www.amazon.co.uk/Geopolitical-Futures-2050-Stephen-Aguilar-Millan/dp/B09244XNXP/>

[2] For more information about the construction and development of the game, see the sequence of blog posts starting at: <http://eufo3.blogspot.com/2020/06/introducing-unfrozen-north.html>

[3] For more information about the construction and development of the game, see the sequence of blog posts starting at: <http://eufo3.blogspot.com/2022/11/the-green-arctic-introducing-game.html>



Stephen Aguilar-Millan

Stephen Aguilar-Millan is the Director of Research of the European Futures Observatory; a foresight think-tank based in the UK. Previously, Stephen has been a member of the Board of the APF (2007-10), the curator of the Emerging Fellows Programme (2017-21) and a member of the APF Foresight Evaluation Task Force (2020-22). An author of five books, several peer reviewed academic articles, and numerous magazine articles, Stephen specialises in geopolitical and economic futures. His LinkedIn page can be found at www.linkedin.com/in/greenways.

THE RIPPLE EFFECT: HUMANITY'S EVOLVING DANCE WITH WATER

By Tamarah Usher and Kiran Carpenter



Image source: Canva



Welcome to the dance of humanity with water, a waltz unfolding over the rhythm of time, a narrative as fluid as its central element. Water, the quintessence of life, embodies an elemental paradox -- it can be as tranquil as a serene lake at dawn or as potent as a storm on the high seas. It is our planet's humble life-giver, an architect of landscapes, a bearer of energy, and a silent chronicler of our relationship with nature. As we move through the kaleidoscopic corridors of the future, this relationship with water is undergoing profound shifts, each ripple in this dance echoing our hopes, fears, and dreams.

In this odyssey, we find ourselves voyaging to 2040 to explore two future worlds, 'Flow Control' and 'Aqua Incarnate,' where we interweave three strands of humanity's

evolving experience and relationship with water: water as a scarce treasure, a powerful force, and a mirror of our planet's health. 'Flow Control' represents a world where water has become a potent energy and information source, yet strictly managed and monitored with rules to govern its usage and distribution. 'Aqua Incarnate' reflects a world where humanity's bond with water has dramatically transformed, shifting from a ubiquitous resource to communal reverence and regeneration. In both scenarios, you'll be introduced to our companions Joaquim and Fiona. These individuals aren't mere inhabitants of these worlds; they embody and exemplify the shift in values and relationships of humanity to water. Joaquim, our community leader and innovator, views

water as a limited power source and seeks sustainable solutions to solve clean energy needs and scarcity simultaneously. For Fiona, our scientist, water is an information carrier, a storyteller of health, and a silent guide to help us navigate change. Their lives and relationships with water vary between worlds, reflecting the broader social, economic, political, and environmental shifts faced in their worlds.

Join us and our companions as we embark and reflect on this exploration of these two futures, guided by the ripple effect of our dance with water.

SCENARIO 1: FLOW CONTROL

This is a future where we take a sharp pivot and find ourselves whisked into the reality of "Flow Control," a harmonious yet stark dance set in a future of limits and discipline. This world is not drenched in

the usual cerulean blues of water's natural flow but in the cold precision of a symphony conducted under the strict surveillance of technology. Water, our life-sustaining duet partner, has evolved into a tracked and controlled entity monitored by an orchestra of AIs and sensors. They maintain the precarious balance between sustainability and consumption beyond no point of return.

Every drop of water dances to the rhythm of order and predictability, meticulously plotted on a sprawling, digitized stage. Daily water allowances evolve beyond simple numbers and take on personal dimensions, becoming unique identifiers that soak into the core of our identities.

But this strictly choreographed ballet isn't devoid of passionate pas de deux. Across the gray grid of conformity, pockets of rebellion emerge with individuals daring to



go against the pre-defined choreography of water usage. Shrouded in the shadows, black markets thrive, and hackers pirouette through the iron curtain of control.

In this tightly choreographed world, we find our companions, Joaquim, and Fiona. Each navigating the intricate dance of "Flow Control," their tales echo resilience and innovation, weaving them into this controlled future's fabric. In this realm of discipline and defiance, following the paths carved by Joaquim and Fiona where each water droplet's ripple resounds with discipline.

JOAQUIM'S STORY-SURFING THE ENERGY WAVE

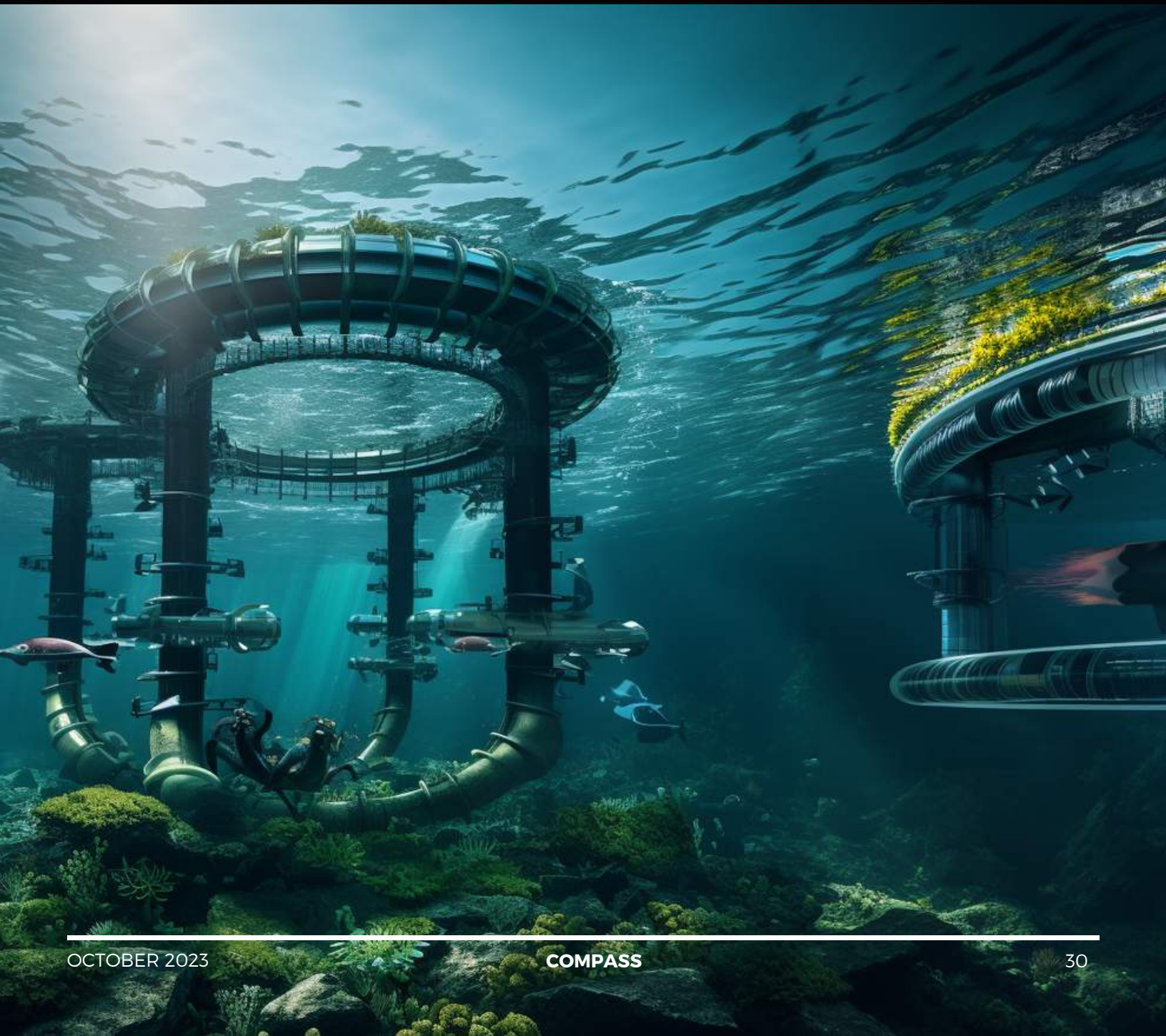
Joaquim was a man of vision, one who perceived his coastal city as an expansive canvas, with the ocean as his ever-inspiring muse. He was captivated by the ceaseless dance of the waves against the shore, a ballet of power, laden with untapped potential. As a respected city leader, Joaquim's life mission was to unlock this potential and harmonize his city's energy needs with the ocean's abundant rhythm, particularly in a world where water had become a primary source of power, a refreshing change from the polluting fossil fuel era.

Under Joaquim's guidance, the cityscape was slowly but surely transformed. He constructed an intricate network of tidal power stations; each designed to harness the ocean's kinetic energy and convert it into electricity. This endeavor synchronized the city's heartbeat with the rhythm of the ocean's tides, a dance that



pulsated with power and prosperity. However, this sustainable paradise wasn't without its shadowy corners. The transition was difficult, with remnants of the old city clinging on, resistant to change. Moreover, not all inhabitants were willing participants in this disciplined dance of sustainability. Hacking attempts on the energy network were not uncommon, a reminder that security was a constant concern in this new era.

Yet, Joaquim's dream was steadily materializing, his city becoming a beacon of sustainable living. His story was a testament to water's empowering nature when embraced in its most primal form. Through his dance with the ocean, Joaquim and his city were carving out their rhythm of resilience, proving that humanity could indeed surf the energy wave powered by the sea's might.



FIONA'S STORY-DISCOVERING DATA IN THE DROPS

In a bustling city of high-rise buildings and sprawling parks, Fiona had found her sanctuary in her cozy apartment tucked away in a quiet corner. Fiona was an environmental scientist with a thirst for knowledge and a passion for studying water. But not just for its physical properties or its role in the ecosystem. She was fascinated by the stories water could tell.



Her lab was her apartment, and her apartment was her lab. One room was filled with water samples from all around the world, each contained in meticulously labeled vials. The other room was a haven for her three pet dogs, each more mischievous than the last. Between the quiet clinking of glass vials and the joyous chaos of her pets, Fiona found her balance.

With advanced technology, Fiona could unravel the secrets water held. Each sample spoke to her, telling tales of changing ecosystems, human activity, and shifting climates. She studied patterns, drew conclusions, and sought to use this knowledge to protect the world she loved. Her findings are uploaded daily to the system by her and others on her team, allowing AI to provide policy leaders and adjust water allowances for the city and its citizens.

Through her studies, Fiona demonstrated that water was more than a mere resource -- it was an information carrier, a forerunner. As she delved into the mysteries held by each droplet, Fiona found a deeper connection with water, one that was rooted in understanding and respect.

SCENARIO 2: AQUA INCARNATE

As we journey deeper into our interplay with water, we cross the threshold into a world of reverence and awe. This is the realm of "Aqua Incarnate," a rhapsody of transformation. In this dimension, the surface of all bodies of water glistens not just with the reflections of our physical world but also resonates with a profound spiritual luminescence.

Water is no longer perceived as a passive participant in our world. Instead, it becomes a living, breathing embodiment of life, commanding respect, and honor. Rivers, lakes, and watersheds gain an unprecedented legal stature, their rights defended by a chorus of AI custodians, their programming echoing the call for preservation and coexistence.

Yet, this newfound reverence doesn't ripple through our societies without provoking a transformation. As the waves of change lap against the shores of our established norms, the structures of society begin to reshape around a harmonious relationship with water. A new balance emerges, a symbiosis that allows technology and society to coexist in tune with the pulsating rhythm of water.

Our companions, Joaquim and Fiona, embody the soul of this spiritual symphony, their tales of resilience and

harmony echoing throughout the "Aqua Incarnate" era. As we traverse this realm, we follow Joaquim and Fiona's footsteps into a world where each water droplet vibrates with life's hymn.

JOAQUIM'S STORY-A SYNCHRONICITY OF SPLASHES

Joaquim was a man who saw the world not just as it appeared but instead as a realm of untapped potential. His coastal city was more than a home — it is a playground and the ocean, his nurturing mentor. Day by day, he was captivated by the lively play of the waves upon the shore, a testament to the ocean's boundless, energetic dance.

Esteemed as a community leader and known for his visionary gaze, Joaquim harbored a unique ambition. He dreamt of drawing energy not from the power of the waves but from the joy and vitality that they stirred in the hearts of his people. In



an era where every form of energy was being explored and exploited, Joaquim pictured a future where his city thrived on the symbiotic energy generation derived from the playful interplay of humans and the sea.

And so, he started his journey. Step by step, he built a network of energy-harvesting swimming pools along the coastline, each designed to capture and convert the kinetic energy from human frolicking into electricity. The city began to hum with the energy of joy and play, each splash, each dive, and each laughter-filled moment fueling its vitality.

The manifestation of Joaquim's dream transformed his city into a beacon of joyous and regenerative sustainability. Through this unique synergy of physical play and energy generation, he demonstrated that humanity's bond with water could be a source of physical and spiritual empowerment. By incorporating the ocean's playful dance into the city's life force, Joaquim guided his community

towards a new rhythm — one of resilience, harmony, and an infectious energy that rejuvenated both the city and the souls of its inhabitants.

FIONA'S STORY-UNFOLDING LIQUID CHRONICLES:

Cocooned amidst a bustling city adorned with towering skyscrapers and sprawling parks, Fiona's modest apartment was an oasis of tranquility. A citizen environmental scientist with an insatiable curiosity, Fiona was enchanted not just by water's physical properties or its ecological role but by the untold stories hidden within its molecules.

Her cozy abode doubled as a home research lab, divided into two distinct universes. One-half of her space housed an array of water samples from far and wide, each preserved in meticulously labeled vials. The other half was a playful haven for her trio of endearing pet dogs, their gleeful antics a delightful contrast to the quiet, deliberate order of her scientific explorations.



Empowered by cutting-edge technology, Fiona delved into the mystery of each water sample. Every drop was a chronicle, whispering tales of fluctuating climates, transforming ecosystems, and the impact of human activity. By deciphering patterns and interpreting this wealth of data, she aimed to harness this knowledge to protect the world she held dear.

In her unique home-lab setting, Fiona revealed that water was not merely a necessity for survival — it was a trove of information, a book of liquid chronicles waiting to be read. As she unraveled the secrets spun by each droplet, Fiona fostered a profound bond with water, one grounded in understanding and mutual respect. To her, every droplet was a storyteller, murmuring tales of climatic shifts, ecosystem transformations, and the far-reaching influence of human activity. Through her detective work, she sought to harness this knowledge to safeguard the environment she so cherished.

SHAPING OUR UNDERSTANDING OF POSSIBLE FUTURES

The power of speculative fiction lies in its ability to shape our understanding and participation in creating futures. By employing an ethnographic lens to explore imagined narratives and potential realities, we can better equip ourselves to navigate uncertainties and steward a better world. Through the intertwining tales of Fiona and Joaquim, we gain insight into the transformative power of water -- a scarce treasure, a powerful force, and a mirror of our planet's health -- and its influence on future societies.

These stories serve not just as cautionary tales or utopian dreams but as catalysts for constructive dialogue and actionable change. They remind us that the dance of humanity with water is an ongoing performance, a fluid narrative that we are collectively authoring.

Approach and Disclosure: This piece of design fiction was created as part of ongoing exploration and research into the use of AI in future scenario development. We have co-created these scenarios and vignettes with ChatGPT through an integrated process of human discussion, light trend, and research into the territory, which then informed the iterative cycle of prompt definition, feedback, and refinement. The final shaping of narratives, writing, and editing was a manual collaboration with Grammarly also adding suggestions. Images included were generated by the authors with a similar feedback and tuning process using Midjourney.





Kiran Carpenter

Kiran Carpenter is a Customer Experience and Innovation Strategist in Slalom's business advisory service, where she focuses on customer and service strategy for user experience and organizational transformation. With an MFA in Design from Boston University, she has spent the last two decades weaving together cultural insights, design methods, business practices, and emerging technology to address challenges and create pathways to tomorrow. A recipient of the 2022 APF Student Recognition Award, she is currently enrolled in the Strategic Foresight master's program at the University of Houston.



Tamarah Usher

Tamarah Usher, a Senior Director at Slalom's global strategy practice, stands as the firm's foremost authority on strategic foresight and quantitative futurism. With over two decades at the crossroads of business and technology, she employs AI as a crucial instrument to decipher emerging trends and future scenarios. Her profound insights equip enterprises to proactively navigate an ever-changing industry landscape, confronting future uncertainties head-on.

An aerial photograph of a residential neighborhood. In the foreground, a large, white, cylindrical water tower stands prominently, surrounded by a gravel area and some utility equipment. The background shows a dense residential area with various houses, streets, and greenery.

HOW TO MODEL A CITY'S FUTURE WATER DEMAND

A practical, 4-step guide in using strategic foresight to solve for ontological unpredictability.

By Samista Jugwanth, Stefan Pike and Aldré Nel

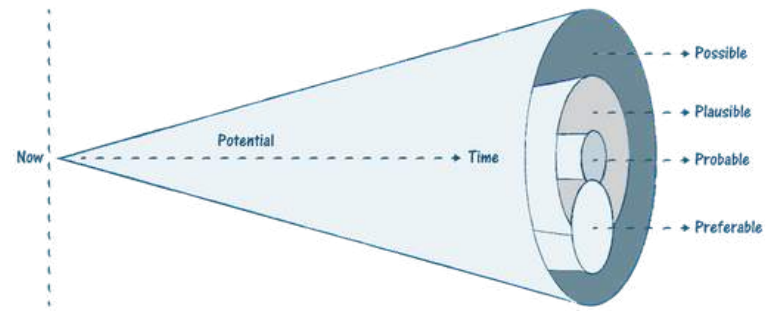
Image source: Canva

For a city to achieve its desired level of water security, effective planning with regards to its bulk water infrastructure is critical. Key to planning for effective infrastructure, is understanding and quantifying a city's future water demand/consumption patterns. Inadequate planning results in water restrictions, higher water tariffs and reduced food security. Indirectly, these limitations also restrict a city's economic growth and urban development.

Traditionally, water demands are predicted (as a single-value outcome) using population counts, historical consumption data (if available), planned Levels of Service, and land usage. However, these four variables do not capture the complexity of the system, especially with the future being increasingly more volatile, uncertain, complex, and ambiguous (VUCA).

APPLYING STRATEGIC FORESIGHT METHODS TO TRADITIONAL WATER DEMAND MODELLING

Water demand is not a single value prediction, but like the futures cone, an envelope of possibilities that diverge as time proceeds. Ontological unpredictability refers to this potential of various realities. Strategic foresight allows one to examine the current drivers and signals that affect water consumption, in order to extrapolate possible outcomes in varying degrees of probability. The intention of identifying possible outcomes is to allow a city (or a larger regional area) to identify potential risks and to have the chance to plan corresponding mitigation strategies. It also allows a city's leaders to anticipate potential opportunities that could be used to enhance growth, innovation, efficiencies, and value.



In this article, we propose a methodology that can be used to model this envelope of water demand projections over time. Step 2 and Step 3 are best completed as a facilitated workshop. Workshop participants should include government officials, design engineers, operations and maintenance staff as well as users (commercial, industrial and residential). Demographic diversity in terms of age, gender and socio-economic level also will lead to more comprehensive results.

STEP 1: DEFINE THE MODEL BOUNDARIES (SPACE AND TIME)

The first step in any model development is to determine the scale of the model. Cities are variable in how different areas behave and react to events and drivers.

As a result, a single model should not be used for a whole city -- rather smaller zones, that account for grouping of socio-economic levels and land use, should be defined. Low-income residential (mainly apartments and lower water needs) areas, high-income residential areas (irrigated gardens and pools), industrial and commercial areas will all have varying requirements and will react differently to changing conditions.

Like the futures cone, the shape of the envelope is time dependant – and therefore, at the outset of the project, it is important to define and communicate the project’s timesteps. As a start, three time-steps, set at five years apart, is recommended.

STEP 2: IDENTIFY AND CATEGORISE DRIVERS USING THE STEEP FRAMEWORK

To start of the workshop, participants must be introduced to the intention of the project, as well as the requirement for divergent thinking. They must also be introduced to the 10 water use categories that make up the city-wide water demand. With this in place, the group will be required to brainstorm the

drivers that they believe will affect water use in their city. Drivers are defined as current trends or variables that may have a significant impact on the future. Demographic shifts, urbanization, and climate change are examples of drivers identified that could impact future water demands significantly.

These drivers are listed using the STEEP-V categorization, with which many professional futurists are familiar. STEEP-V is an acronym for social, technological, economic, environmental, political aspects, and values. It is a useful framework to assist in brainstorming and categorizing data for further analysis. In a water demand context, factors for each driver include:



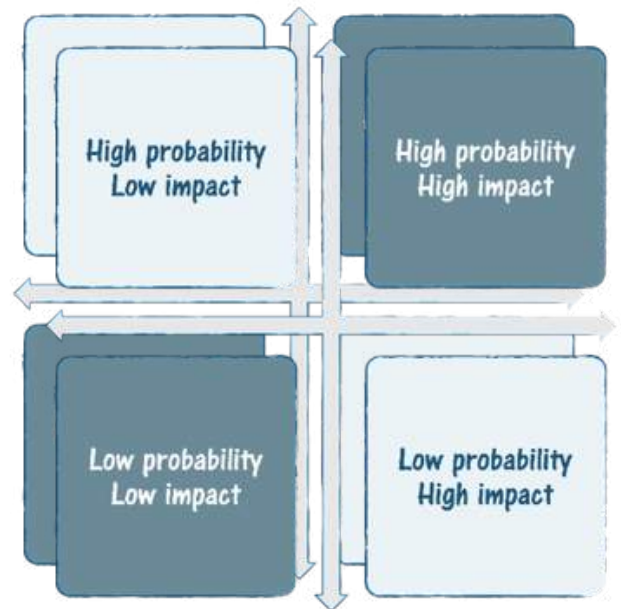


Image source: Canva

- Social factors: Demographic data and other societal issues such as water awareness, illegal water connections, inviting consumers to use recycled water, etc.
- Technological factors: Technological advancements in water-use efficiency (water recycling systems), water storage systems, rainwater harvesting, and developing new technologies to harvest water, such as desalinization plants and off-shore water mining.
- Environmental factors: Ecological and environmental aspects such as weather, climate, pollution, and climate change.
- Economic factors: Gross domestic product per capita, affordability (raising/lowering the cost of water for users), socio-economic levels, infrastructure age, proposed future developments etc.
- Political factors: States of unrest, level of governance and service delivery, and regulatory factors pertaining to water consumption and demand.
- Values factors: Moral obligation to treat all water users equally and equitably, the right for all people to clean drinking water (safety), treating water as sacred, creating water systems that will benefit future generations, etc.

In previous workshops, this exercise has resulted in over 100+ drivers or variables as opposed to the traditional four.

STEP 3: RELATE DRIVERS TO CONSEQUENCES AND PRIORITIZE



The drivers identified in Step 2 are extrapolated into consequences on water demand.

For example, an economic upturn would result in higher salaries and consumption which result in greater household water demand. It is important to note that consequences can be combined or extended from each other creating degrees of consequences.

Another example, higher salaries and production results in greater taxation, which can lead to an increase in public infrastructure (such as parks, stadiums, etc.) and its associated water demand. Because the combinations of drivers and consequences may be too expansive to model – it's important to prioritize those that are highly likely versus those that are not likely or not relevant to a particular city.

To solve for this, the consequences are categorized in the four quadrants of the probability-impact chart. The intersection between probability and impact provides an indication of the significance. Using the probability-impact matrix, the position of consequences on the quad chart, can be translated into a significance level, allowing the modeler to prioritize consequences with a high or very-high rankings. This forms a sensitivity analysis, as the drivers (variables) that contributed the derivation of the highly and very-high significant consequences are used in the water demand model.

STEP 4: CONFIRM SCENARIOS TO MODEL

The set of variables to model has now been refined. The next step is to confirm the scenarios that will be modeled to form the water demand envelope.



IMPACT		Negligible	Minor	Moderate	Major	Significant
PROBABILITY	Very Likely	Medium	Medium	High	Very High	Very High
	Likely	Medium	Medium	High	High	Very High
	Possible	Low	Medium	Medium	High	Very High
	Unlikely	Low	Low	Medium	Medium	High
	Very Unlikely	Low	Low	Medium	Medium	High

In this respect the Four Future Archetypes (Growth, Constraint, Collapse and Transformation) have been modified. The ability to constrain and transform water demand has been interpreted as the potential to dramatically curtail water consumption in the event of a water shortage.

This Curtailment scenario assumes that there is an increase in desired water behavior (through awareness programs) that leads to lower water use, such as people watering their lawns/gardens less, taking shorter showers, installing water-saving appliances (low-flush toilets), etc., as well as using alternative water sources



(such as grey water and rainwater harvesting systems). Therefore, although only three main scenarios are identified (Growth, Conventional and Collapse), there are a further three corresponding

Curtailment sub-scenarios. Using this, a city is able to understand the varying requirements of the system, as well as to identify just how much they can restrict water consumption based on the path that they are on.

The significant consequences from Step 3 are distributed into the scenarios in order illustrate to the modeller how the selected variables are affected. The table below is an example based on previous projects:



Image source: Canva

Scenario	Description
<p>Scenario 1: Growth</p> 	<p>The urban capacity for growth and densification is on the rise and the city is under tremendous stress to supply the most basic need to its inhabitants – water. This includes a high population growth rate, improvement in the Level of Service required, increase in economic activity, urban greenery and urban/indoor farming. It also is representative of high bulk water losses caused by ageing infrastructure.</p>
<p>Scenario 1C: Curtailed Growth</p>	<p>Growth + Curtailment measures: Intentional reduction in water use, increased use of water saving devices, initiatives, and increase use of alternative water sources.</p>
<p>Scenario 2: Conventional</p> 	<p>Water is consumed in the manner that it is currently. An average growth rate is assumed with negligible change in land use or Level of Services.</p>
<p>Scenario 2C: Curtailed Conventional</p>	<p>Conventional + Curtailment measures as described in 1C</p>
<p>Scenario 3: Collapse</p> 	<p>Changes in policy and technology, combined with socio-economic factors influenced by world events, drive people away from the city to smaller urban and rural areas. This is evident by low population growth rates, no change in Level of Service, decrease in economic activity, no improvement in urban greenery and urban/indoor farming. Due to infrastructure upgrades, bulk water losses are reduced, and there is some privatization (including off-grid systems) of water supply.</p>
<p>Scenario 3C: Curtailed Collapse</p>	<p>Collapse + Curtailment measures as described in 1C</p>

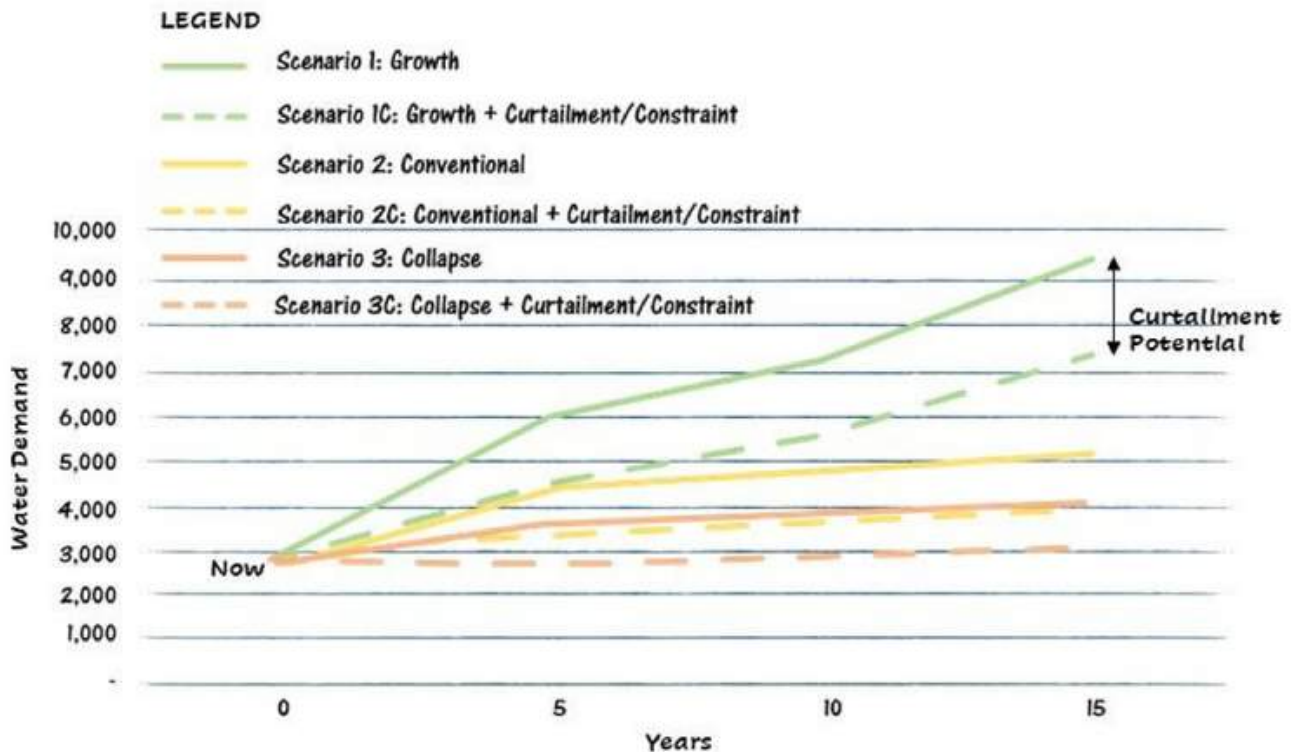
This methodology allows one to identify the variables that are critical to each city investigated. It further produces the scenarios that need to be modelled in order to forecast the possible water demand scenarios that could exist over time – creating an envelope of water demands that mimic a futures cone.

It is interesting to note that some of these scenarios have different effects on the water demand relative to the time interval being examined. This method also allows a city to understand how it can reduce or curtail its water demand in the event of shortages or an emergency, as well as to quantify this.

Once again, the extent of curtailment changes across scenarios and time intervals. With this level of information, a city can design its bulk water infrastructure to be adaptable and resilient in the face of our volatile and unpredictable future.

AUTHOR'S NOTE:

Illustrations by Ruzaan Byleveld, Graphics Designer at Zutari.



Samista Jugwanth

Samista Jugwanth is a professionally registered Engineer and Technical Director at Zutari, one of largest African based engineering and advisory consultancies. She is also an External Examiner and Industry Advisory Board Member for the Civil Engineering school at the University of Kwa-Zulu Natal.



Stefan Pike

Stefan Pike is a professionally registered Engineer at Zutari, with a focus on non-revenue water, and has eight years of experience in the planning and design of bulk water infrastructure within the civil consulting industry. He has a passion for uplifting communities and economies in Africa through the delivery of water infrastructure.



Aldré Nel

Aldré Nel completed his undergraduate and postgraduate studies in civil engineering at the University of Stellenbosch. He joined Zutari's Bulk Water team in 2022 and has been involved in the design of treated effluent pump stations and river abstraction works.





FORESIGHT CAN PLAY CRITICAL ROLE IN GLOBAL WATER RESOURCE MANAGEMENT

By Catherine Cosgrove

Image source: Canva

Author's note: This article stems from several years of meaningful collaboration with my father, fellow APFer and leading world water expert, William J. Cosgrove.

Water is at the nexus of individual and collective self-preservation. It has led to the rise and fall of civilizations. And yet, access to, and the availability of, freshwater have never been at greater risk in human history. According to the [UN World Water Development Report 2023](#):

- 10% of the world's population (roughly 810 million people) live in countries with 'high' or 'critical' water stress.
- Between 2 and 3 billion people worldwide experience water shortages.
- 1 person in 4 does not have access to safely managed drinking water services.
- [One-fifth](#) of the world's river basins are experiencing dramatic shifts in water availability. As a result of climate change, seasonal water scarcity is taking hold in regions where freshwater is currently abundant – such as Central Africa, East Asia and parts of South America – and getting worse where there is short supply to begin with – such as the Middle East and the Sahel in Africa.
- Humans are not the only beings at risk: 126,000 species, ranging from fish and molluscs to plants and mammals, [rely on freshwater habitats](#) for their survival.



Image source: Canva



Image source: Shutterstock

GEOPHYSICS, INPUTS AND OUTPUTS

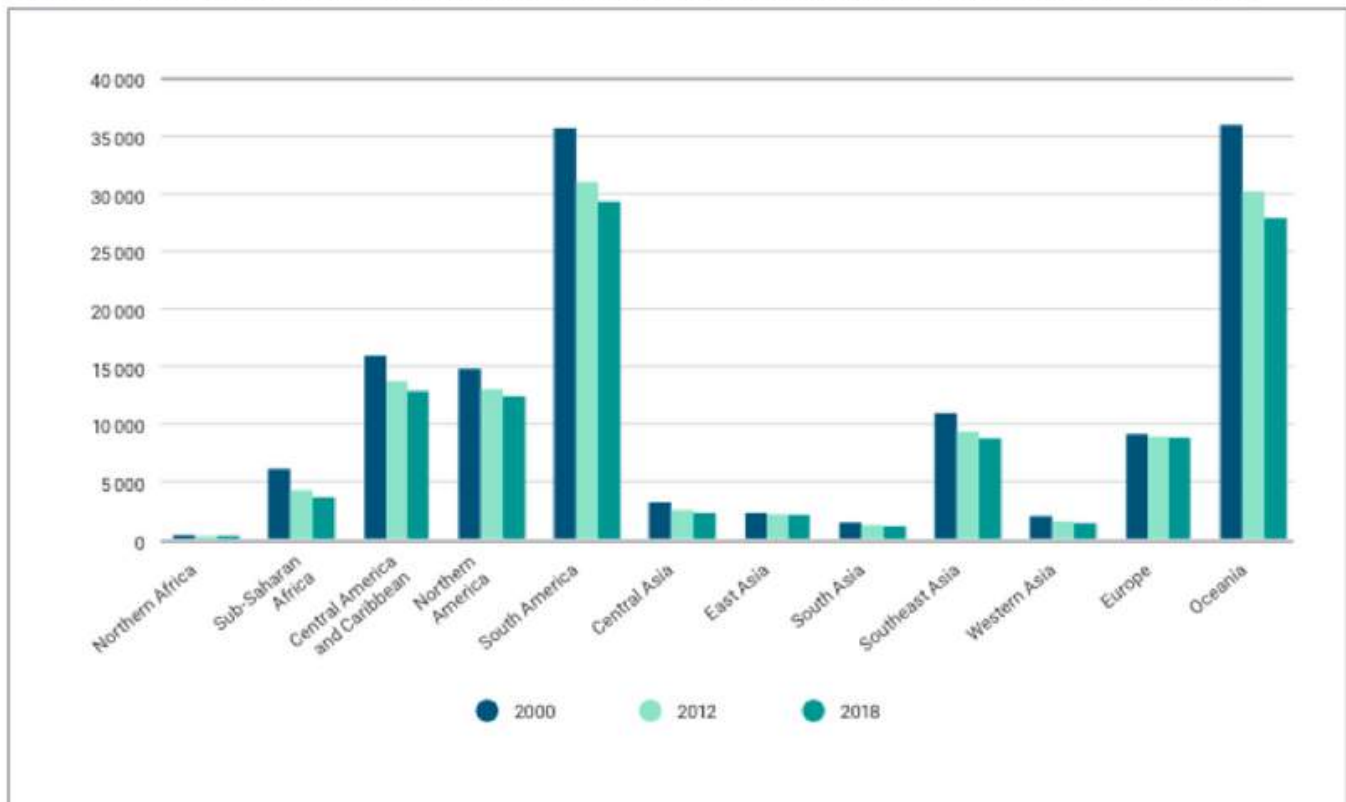
How can water scarcity possibly come into play when Earth is known as the blue planet?

At a very basic level, contrary to [marine birds](#), our organs did not evolve to digest saltwater. Yet freshwater makes up less than 3 percent of the world's total water resources, and the vast majority of freshwater is in fact inaccessible, according to the [U.S. Geological Survey](#). Water pollution impacts the freshwater that is available: a recent survey of 75,000 bodies of water in 89 countries found that [more than 40 per cent](#) of freshwater sources were severely polluted.

We are consuming water at a higher rate than what is available and can possibly be replenished. Population increases, development and diet upgrading are highly water-intensive. That one steak on the menu last night required [1,000 gallons](#) (3,785 liters) of water to produce.

Available renewable fresh water per capita is in steady decline in every single region of the world (see Figure 1). Demand for fresh water is expected to [outstrip supply by 40%](#) by 2030.

Figure P.3 Per capita renewable water resources availability by geographic region, 2000, 2012 and 2018 (m³/capita)



Source: FAO (2022, fig. 1.21, p. 69, based on AQUASTAT).

Image source: : <https://unesdoc.unesco.org/ark:/48223/pf0000384655>

WATER ON THE INTERNATIONAL AGENDA

Access to safe and clean drinking water was recognized by the UN as a [human right](#) in 2010. In practice, the world community needs to [quadruple the efforts](#) in order to achieve access to water and sanitation for all (SDG 6) targets by 2030.

A simultaneous reflection of our delay to act, and of global leaders stirring to take note, is the fact that the first United Nations conference in [46 years](#) on the state of freshwater was held in March 2023.

WHO'S IN CHARGE: MOVING OUTSIDE THE 'WATERBOX'

This leads us to ask, who's in charge of managing this shared, vital resource? Can't we make sure they allot it appropriately?

Traditionally, water managers have indeed been able to make recommendations for routinely managed systems. They based their analysis on geophysical parameters (precipitation, runoff, infiltration) on one hand, and on the human activities that affect water quality, flow and distribution over space and time, on the other. Historical data and mathematical analysis provided an organized framework for decision-making that has been coined 'the water box' (Figure 3). This approach worked well... until it didn't.

The decisions being made outside the water box by different levels of government, industry, and the private sector, with regards to water needs (including energy and agriculture), but also

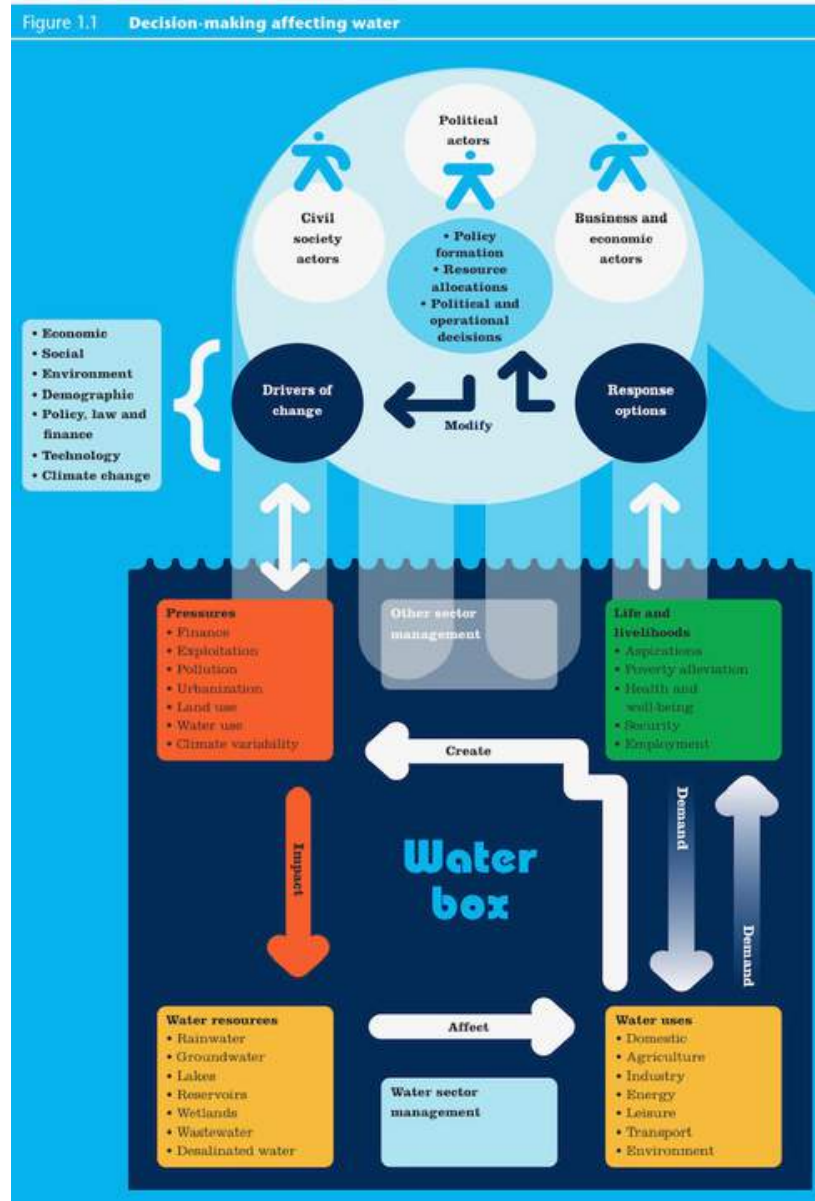


Image source: : UNWWAP/UNESCO, 2009, Content Coordinator: William Cosgrove [Water in a changing world: the United Nations world water development report 3](#)

with regards to how we approach natural resources overall (education, technological innovation, legal and investment frameworks) are becoming increasingly unpredictable and irreconcilable.

Making sound decisions for the whole of the community requires returning to the political actors and other stakeholders in the decision-making process for responses that take all the constraints into account.



Image source: Shutterstock

HOW FORESIGHT CAN CONTRIBUTE TO UNDERSTANDING AND INFLUENCE THE GLOBAL FUTURE OF WATER

The first efforts to address the future of water globally were launched in the late 1990s. Around the same time that [Professor Igor Shiklomanov](#) was creating the [first global assessments](#) of world water availability and use, a **first global participatory water scenarios process** was underway, directed by APFer, water engineer and leading world water expert, William Cosgrove (see box). The [World Water Vision](#), released in 2000, involved qualitative and quantitative modelling, integrating 15 regional visions through an iterative process. The normative scenario, 'Vision for 2025,' called for such radical and transformative change that it was not possible for modelers to map it.



William Cosgrove, author of the World Water Vision, speaking at the BioVision Alexandria 2010 Conference. A water and sanitation engineer, now retired, Cosgrove is former President of the Bureau d'audiences publiques sur l'environnement in Québec, Past-President of the World Water Council, former Vice President of the World Bank and served as Chairman of the International Steering Committee of the Dialogue on Water and Climate.

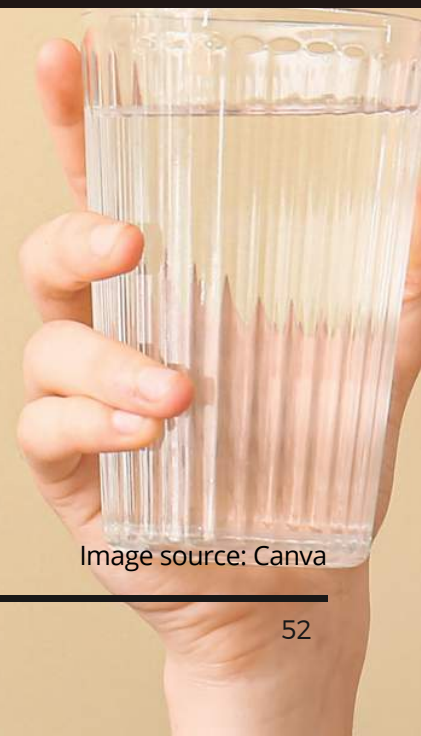
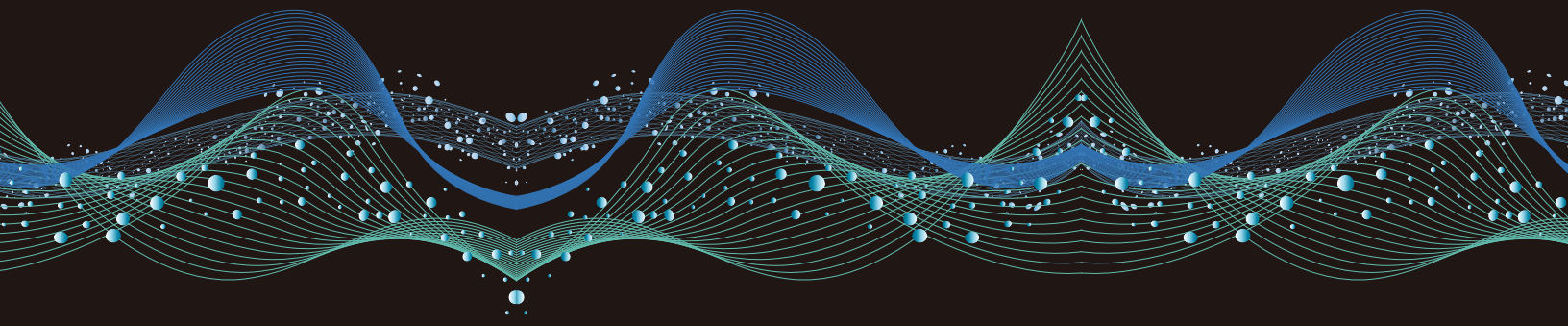


Image source: Canva



THE WORLD WATER VISION: A HARBINGER OF FUTURE PARTICIPATORY, MULTISECTORAL & MULTI-LEVEL DECISIONMAKING?

In the late 1990s, *the World Water Vision* effort took shape, guided by the World Water Council and directed by William Cosgrove.

The vision used a scenario building process with one critical component: grassroots participation. Over two years, more than **15,000 women and men at local, district, national, regional and international levels** shared their aspirations and developed strategies for practical action on how to use and manage water sustainably.

Professionals and stakeholders worked together to develop **15 integrated regional Visions**. This Story and Simulation approach involved the harmonization of the qualitative and quantitative scenarios through an iterative process relying on interaction between scenario writers, data and sector experts, global modelers and stakeholders. The resulting vision and report, [World Water Vision: Making Water Everybody's Business](#), was presented at the Second World Water Forum in 2000.

The Vision report described four scenarios for the future of water resources up to 2035. The first three were: 1.) *Business as Usual*, **leading to a crisis we are seeing unfold**; 2.) *Technology, Economics and Private Sector*, where mainly technological solutions leave the poorest countries behind; and 3.) *Values and Lifestyles*, where a strengthening of humanistic values and concerted sustainable and equitable development initiatives limit water and food scarcity but do not overcome it. The fourth scenario, called, *Vision for 2025*, was a preferred future where everyone has access to safe water and enough food, global consumption is harmonized and almost all solid and liquid waste is managed responsibly.

Achieving the Vision for 2025 depended on so much change that the modelers were unable to quantify it for backcasting purposes. The authors and participants at the Forum recognized that the key to achieving the vision would lie in the true grassroots stakeholder empowerment.

THE WORLD WATER SCENARIOS TO 2050 PROJECT

In 2010, with the effects of climate change and of human development on water becoming more urgent, the UN World Water Assessment Programme / UNESCO launched an updated scenarios project to 2050, with a view to again involve stakeholders and modelers.

In the first phase, coordinated by APFers William Cosgrove and Catherine Cosgrove, 10 major drivers of change were analyzed in consultation with more than 100 global experts using [Ted Gordon's](#) RT Delphi process, among others.

A portrait of the current state of the drivers and comments on the future likelihood and importance of key developments to 2050 was published as [The Dynamics of global water futures: driving forces 2011-2050](#). It was released together with Gilberto Gallopin's [five stylized, contrasting scenarios](#) based on this research, all alongside the World Water Development Report 4: [Managing Uncertainty and Risk](#).

The map of key drivers and causal links affecting water stress, sustainability and human well-being are shown in Figure 3.

Key drivers and causal links affecting water stress and sustainability and human well-being

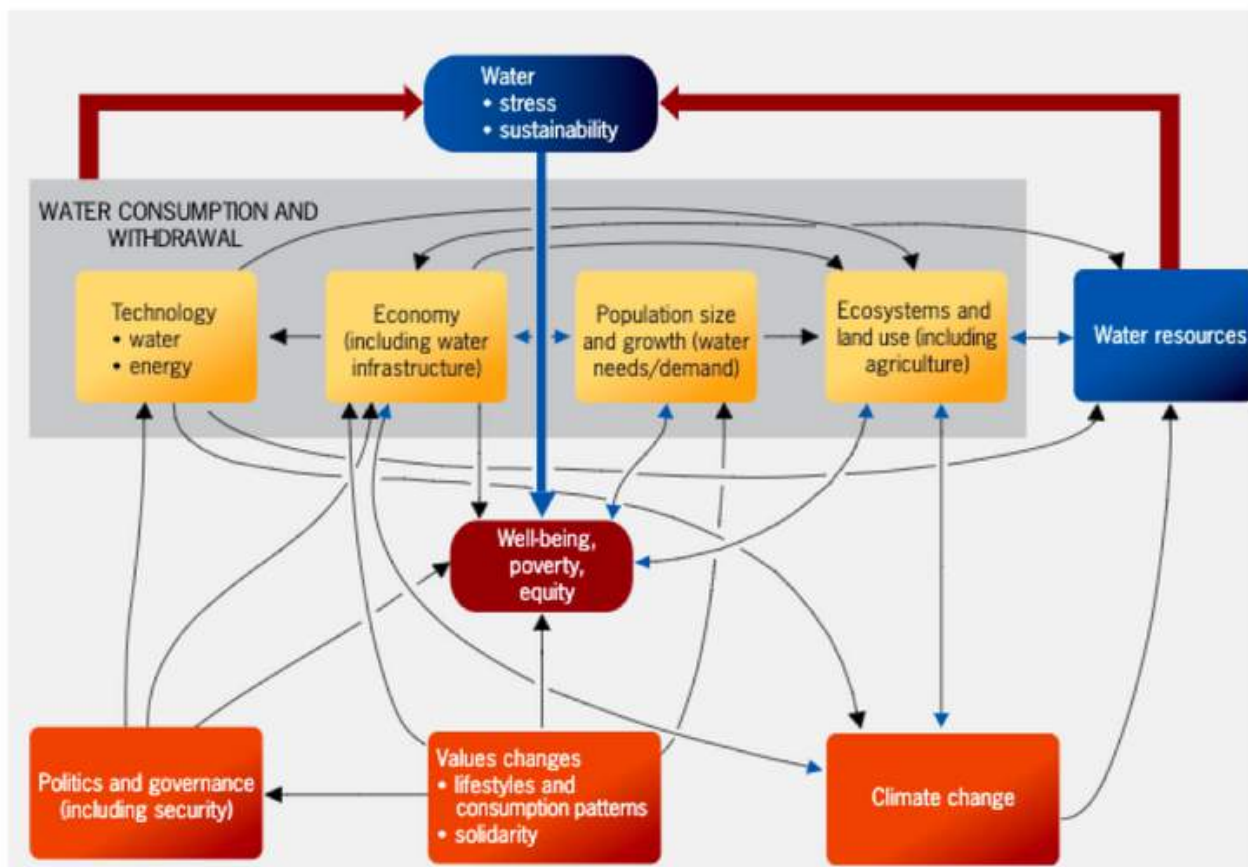


Image source: : From Five Stylized Scenarios Gilberto C. Gallopin, UNWWAP, 2012

Before funding dried up in the aftermath of the 2008 financial crisis, the subsequent phases of the project were to include quantitative and qualitative analysis and storylines prepared with input by a global scenario focus group, to be used by local actors as background material for the preparation of transboundary-basin, national, subnational scenarios. Adjusted global and local scenarios would then be disseminated along with outreach and training to strengthen the capacity of water managers and professionals at all levels to work across sectors. Materials and training also would be needed to inform political decision-making and address risks and uncertainties linked to global changes. This project is being carried forward by the [International Institute of Applied Systems Analysis \(IIASA\)](#) as their [Water Futures & Solutions Project](#).

THE WAY FORWARD: RELEVANCE, CREDIBILITY, LEGITIMACY, TRANSFORMATION, ITERATION AND ACTION

Although the time may have already passed to avoid the brunt of the water crisis' impact on humans and the ecosystems we depend on, foresight is, in our view, still the most hopeful approach to move any transformational change forward.

Foresight's tools and approaches can play an integral role in helping shape decisions on water at the local, river-basin or global water system scales -- whether to uncover critical uncertainties, to tap the collective will and creativity of users and communities, or to assess the robustness of policy solutions.



Image source: Shutterstock

In 2013, based on joint analysis with William Cosgrove of the water governance and politics drivers of change, and our own experience, we [articulated our view](#) in the *Journal of Development Studies* (56(4)) that to succeed, sustainable water futures initiatives must be designed in keeping with the following criteria:

- **Policy relevant:** Water scenarios should be developed as close as possible to the scale at which water managers work. They should also be **scalable -- and interrelated to -- the local, regional and global levels**, with the types of information needed at all levels of decision-making;
- **Scientifically credible: Applying systems analysis** to help bridge the gap between science, policy and practice allows for a solid underpinning in interdisciplinary science, further reinforcing credibility among all stakeholders. A solution to help bridge the science-policy gap was brought forward by UNESCO at the 2023 World Water Conference for each country to conduct a [scientific assessment of domestic water resources](#), with an appropriate intergovernmental mechanism validating the complete report;
- **Perceived as legitimate by different stakeholders: The central element of any legitimacy in this context is stakeholder engagement.** The involvement of stakeholders at the local and national levels has been shown to effectively influence policy and governance. Any lasting change at the global level will have to come at the local level (communities, towns, cities, counties). Involving a broader scope of stakeholders will also open the door to increased communication between groups who are not used to working in close collaboration.

Developments and initiatives in knowledge management and ecosystem-building over the last decade, along with changes in the overall context, have led me to identify three additional key criteria:

1) Transformational: Truly participatory processes that give a voice to all stakeholders (and not just the majority) have the potential to disrupt dominant assumptions and trajectories. However, there is increasing focus on designing processes to target the emerging evolution of societal needs to live within planetary boundaries, and which involve harnessing co-design, evolution, systems and transformation. Such organizations include the Tellus Institute's [Great Transition Initiative](#) (of which former colleague Gilberto Gallopín is a member); [The Millennium Project](#) founded by Jerry Glenn and Ted Gordon; [Ciblexpert](#) (client-collaborator); as well as the [Stockholm Resilience Center](#), the [Cascade Institute](#), [Dark Matter Labs](#), the [Global Resilience Institute](#), the [Systems Change Lab](#), to name only a few.

2) Perpetually fluid and iterative: In periods of uncertainty and increased complexity -- not to mention collapse -- the foresight process should be perpetually iterative. Parameters should be updated based on new data and on the impact of stakeholders' actions in their loci of power. Decisionmakers can then regularly 'check-in' with the state of play to determine new courses of action that may not have previously been available or made sense. This, of course, will have to be balanced with attention to overall cohesion in the narratives of change.

3) Actionable: Capacity to ascribe actions that can be taken in the immediate, and by different, reconfiguring groups of collaborators: As we keep our eyes on the broader, long-term picture, we can only emphasize the need to move forward based on the best information available at the time. Some actions can be taken without having the full map of the journey, as was the case with the road forward for the *World Water Vision 2025*; others may be dependent on moving conditions, and on different and shifting collaborations.

***The point is:* We need to foster systems change where and when we can, monitor the results, regroup, and be steadfast in the overall direction.** The iterative and actionable criteria are notably reflected in line with the [Estuarine Mapping Framework](#) developed at Cynefin, and Ed Morrison's [Strategic Doing Approach](#).

Data will have to be developed to define and support the use of these criteria. With the data and technology such as AGI, it is our hope that enabling leadership coming from the ground up will set us in new directions, with new ways of doing.



Catherine Cosgrove

*Catherine Cosgrove is a big-picture thinker with a passion for enabling organizations to be resilient and to co-create their future. She has advised executives in complex organizations across the public, private and non-profit sectors on areas ranging from foresight, policy and strategic planning to communications and corporate affairs. She is author and contributor to several UN reports related to water, land degradation and desertification, including *The Dynamics of World Water Futures: Driving Forces 2011-2050*. A member of the Quebec Bar, Catherine has Masters in Futures Studies from the University of Houston and is a former Board member of the Association of Professional Futurists.*

An aerial photograph of a cargo ship's deck. The deck is covered with numerous colorful shipping containers in shades of red, blue, yellow, and white. In the center-right, a large white smokestack is emitting a thick plume of white smoke that rises into the air. The ship's white superstructure and railings are visible, along with various pieces of equipment and ladders on the deck. The background shows the dark blue-green ocean.

MANAGING CO₂ IN OUR OCEANS: THE GREATEST CHALLENGE OF OUR TIME

By Jill Storey

Image source: Canva

Our reliance on water in virtually every human activity is self-evident but will it prove to be a major factor in the combating of the greatest environmental threat ever faced by mankind? We keep wishing to rush to space, but should we not be focusing as much energy and research into the understanding of our oceans?

Today, as the surface temperatures of the world's oceans reach their highest recorded levels and the usually moderate United Nations chief warns that we are entering an era of "global boiling," the threat to life on Earth from anthropogenic emissions as we know it is difficult to dispute.

Atmospheric carbon dioxide levels have reached historically unprecedented levels, higher than at any time in the past 800,000 years.

It has become clear that if we want to have any hope of limiting global warming to 1.5 degrees, our efforts at reducing emissions have been insufficient and it will be necessary to intentionally remove billions of tons of carbon dioxide from the atmosphere.

To date, most of the carbon dioxide removal opportunities have focused on land-based solutions such as soil carbon, afforestation and direct air-capture, but land-based solutions face issues with scalability as projects compete for land use, and in the case of forests, permanence, as we have seen with the growing number of wildfires on multiple continents.

OUR LARGEST CARBON SINK

Our oceans, which represent 71% of the Earth's surface, are the Earth's largest carbon sink, holding 44 times more CO₂ than the atmosphere. Ninety-three percent of the Earth's active carbon cycle is found in the ocean with 38,000 gigatons mostly in dissolved form compared to the 860 Gt in the atmosphere. So far, it has absorbed around 30% of the CO₂ humans have emitted and around 90% of the heat generated from climate change.

It should therefore come as no surprise that we should look to the oceans to understand how the natural processes, which have been storing carbon for millennia, can be enhanced and accelerated.

ENHANCING AND ACCELERATING NATURAL OCEAN CARBON SEQUESTRATION PROCESSES

Carbon sequestration in the ocean occurs naturally through several interconnected processes, primarily involving the biological and geological carbon pumps.

Solutions for ocean carbon dioxide removal that look to enhance the **biological pump** include: Seaweed farming, nutrient fertilization, eco-system restoration and artificial upwelling and downwelling. These solutions involve ocean plants as they photosynthesize in seawater to take up carbon dioxide and store carbon as biomass.

Six of the prominent ocean-based carbon dioxide removal methods considered in the National Academies of Science, Engineering and Medicine report. (Illustrated by Natalie Renier, © Woods Hole Oceanographic Institution)

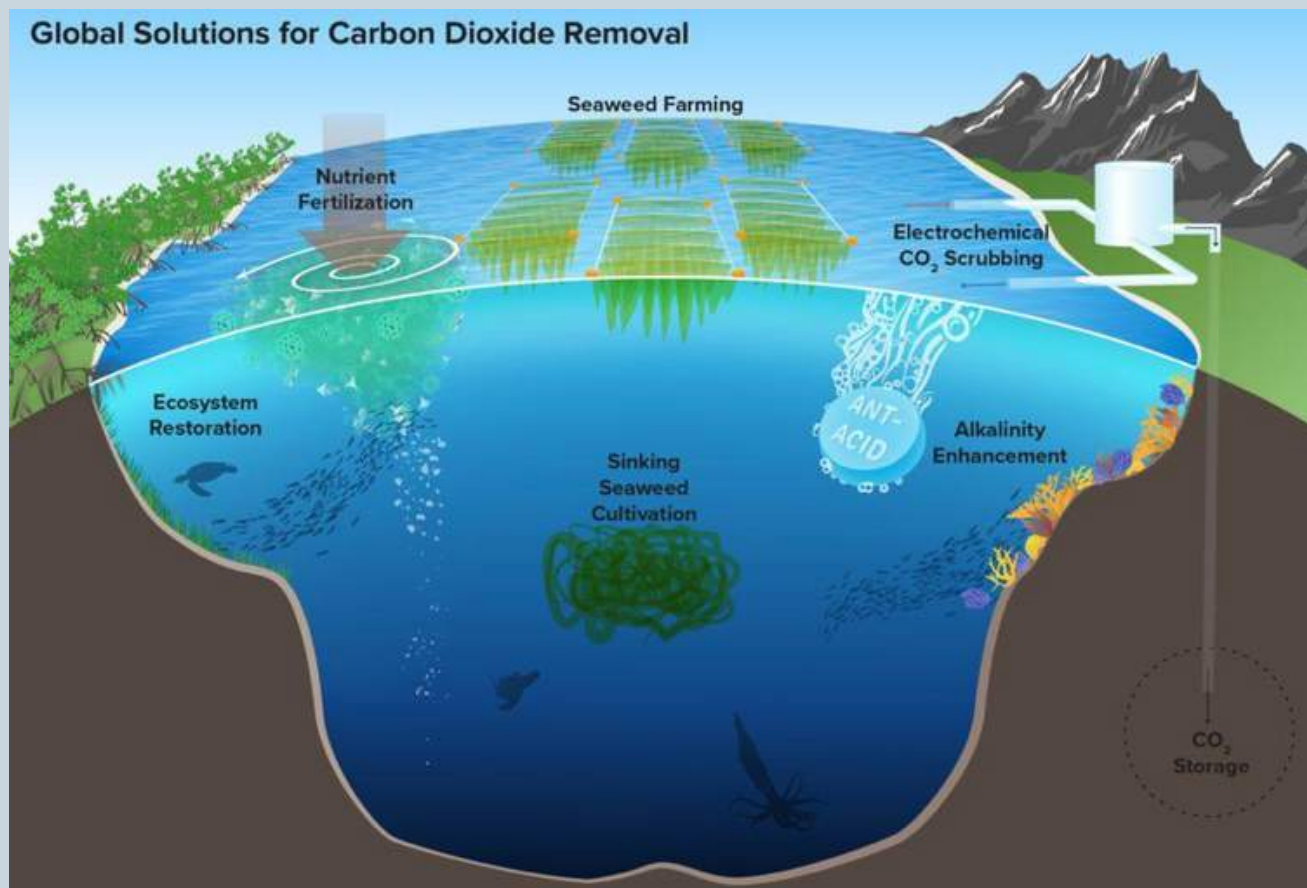
Solutions that look to enhance the “**geological**” or “**abiotic pump**” harness the physical or chemical properties of the ocean to remove CO₂ from the air and include alkalinity enhancement and the electrochemical removal of CO₂ from seawater with burial in underground reservoirs.

CAN WATER-BASED OCEAN SOLUTIONS PROVIDE THE ANSWER?

SCALE

To reverse “global boiling” we need to remove many gigatons of CO₂ from the atmosphere so solutions must be scalable. The oceans have the space and projections have been made that many of the ocean technologies have the potential to remove many gigatons of CO₂.

However, anyone who has started a new venture will know that scaling is hard and even more so when it is being undertaken in a possibly hostile environment – in the deep ocean miles from shore.



Six of the prominent ocean-based carbon dioxide removal methods considered in the National Academies of Science, Engineering and Medicine report.

Image Source: Illustrated by Natalie Renier, © Woods Hole Oceanographic Institution

PERMANENCE

To make an impact the CO₂ that is removed needs to be kept out of the atmosphere for long periods of time. It is believed that some of the ocean solutions have the potential to sequester CO₂ for hundreds of years.

PRICE

To have the chance of being implemented at scale the solutions must be able to be undertaken at a price that will be viable. Early costings for some of the ocean technologies indicate that they will be commercially viable at scale.

A FUTURE OCEAN PICTURE – ZONING IN ON ONE OF THE POTENTIAL TECHNOLOGIES

To see what the future could hold for the waters in our oceans, nutrient fertilization, one of the six prominent ocean technologies described in the US National Academies of Science, Engineering and Medicine report, has been selected to be illustrated.

The 2022 “A Research Strategy for Ocean-Based Carbon Dioxide Removal and Sequestration” report assessed the six

technologies against the following criteria: knowledge base, efficacy, durability or permanence, scale, the ability to monitor and verify the amount of carbon sequestered, the viability and barriers including social and environmental impacts together with governance and social dimensions.

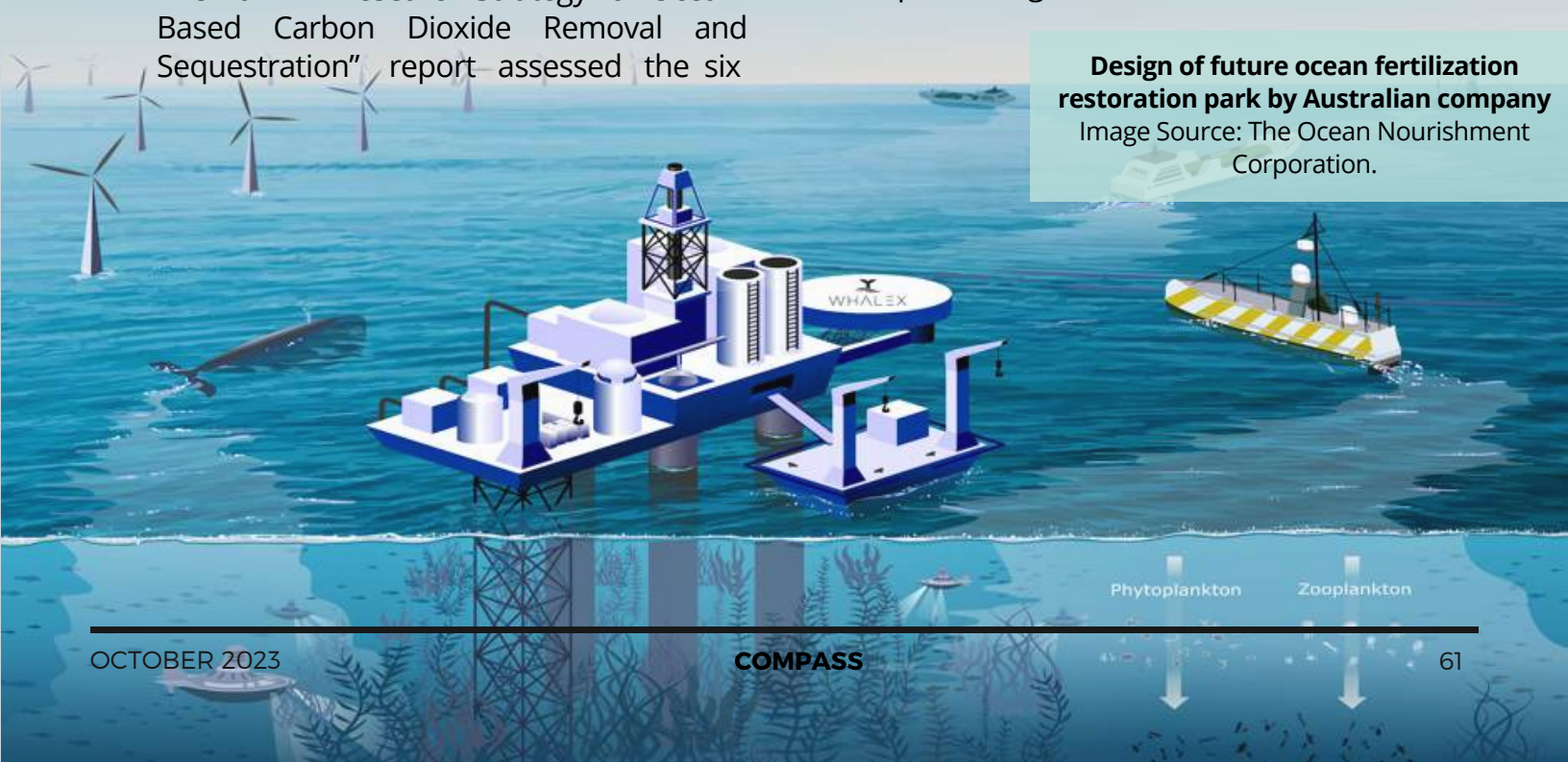
Nutrient fertilization has been selected on the basis that the report says there is medium to high confidence that this approach will be effective and scalable, with medium environmental risks and with low scale-up costs beyond the costs for environmental monitoring.

Nutrient fertilization adds nutrients such as iron, nitrogen or phosphorus to the ocean surface to increase photosynthesis by phytoplankton, thereby increasing the uptake of CO₂ and transfer of carbon to the deep ocean, where it can stay for a century or longer.

A team from Australia have created a design for their fertilization restoration parks which they anticipate will be capable of sequestering millions of tons of CO₂.

Design of future ocean fertilization restoration park by Australian company

Image Source: The Ocean Nourishment Corporation.



Their parks will be positioned offshore in waters where nitrogen is the limiting nutrient. They plan by 2030 to use green ammonia that will be either created in modular units on site using offshore wind as the energy source or transported by ship to their sites.

The team have been working on creating their nutrient mix to mimic whale poo. Whale excreta is rich in the nutrients that grow phytoplankton which form the base of the oceanic food chain.

There used to be 4-5 million whales in our oceans excreting up to 200 litres (52.8 gallons) per day but now there are only 1.3 million, so the initial aim is to replace the lost nutrients.

The parks will be monitored by satellite and autonomous underwater vehicles.

Data collected will be used to monitor and assess the ocean habitat dynamics and determine the precise whale poo nutrient composition required to create the optimal conditions for controlled phytoplankton growth.

Increasing the phytoplankton can provide feed for krill which form the main food source for whales.

Additional benefits are also expected in the form of both increases in the fish stocks and increased biodiversity in the newly reforested marine environments.

So, what are we waiting for? Why, almost quarter of a century after visionary Australian Professor Ian Jones began pioneering his revolutionary artificial whale poo climate solution, are we not

already taking millions of tons of CO₂ out of the atmosphere?

THE SURPRISING EMBRYONIC STATE OF OCEAN-BASED CARBON DIOXIDE REMOVAL

Although there is much talk about space travel and life on Mars, it is surprising how much is still unknown about our oceans. We have neglected this vital area of research even though many of the concepts of enhancing the ocean's uptake of carbon dioxide have been around for decades.

Ocean fertilization along with other ocean carbon removal approaches are all at an embryonic stage of development, with little testing happening in the water.

There is now an increasing urgency to fund research to improve our scientific understanding of the impact of the proposed technologies. It is not clear how, for example, ocean fertilization or alkalinity enhancement will impact marine ecosystems over the long-term. Controlled research sites are required to test the concepts both at increasing scale and over time.

WHAT NEXT?

It is quite clear that our scientific understanding of the relationship between our oceans and CO₂ removal must be accelerated. This includes identifying and addressing potential undesirable geochemical and ecological consequences, as well as understanding of the social and economic impacts on local and indigenous communities.

Global governance promoting international cooperation must develop at a steady pace

and set the stage for permitting and a new regulatory environment that will allow for responsible research. This research should aim to develop an unbiased and improved base of knowledge about ocean-based CO2 removal for the public, stakeholders, and policymakers to use without advocating for any one specific approach.

Much work is still required around the measurement and verification of the carbon sequestered under the various approaches. To be financeable at scale, the sequestration must be verifiable, additional, and permanent with any leakage factored into the calculations and costings.

Investment into companies actively developing pathways for ocean carbon removal has been starting to happen with some large corporates starting to engage in the space.

WHY FUTURISTS SHOULD CONSIDER THIS

No doubt, many professional futurists who read this are considering the consequences of climate change into various scenarios and images of the future they are developing for their organizations or clients to which they are advising.

My challenge to you is not to underestimate the gravity of not caring for our oceans, which cover more than 70 percent of our planet's surface.

As we rapidly need to confront climate change, the greatest challenge of our time, the water of our oceans provides the best opportunity we have to save humanity.

While we need to carefully assess the environmental impact and potential unintended consequences, the risk of doing nothing is not zero.

We must all become aware of the consequences of our current trajectory and must rapidly invest and scale experiments into protecting the health of our oceans, including ocean-based carbon removal technologies.



Jill Storey

Jill Storey focuses on accelerating ocean-based carbon dioxide removal solutions and how carbon pricing and financial interventions can play a role in assisting organisations and governments move the dial more rapidly to net zero. She has 25 years' experience working in the international consulting field having been a partner with Andersen, Deloitte and KPMG.

To connect with Jill, visit her LinkedIn page at: www.linkedin.com/in/jillstorey. To learn more about her work, click [here](#).



THE FUTURE OF WATER IN OUTER SPACE AND WHAT IT MEANS FOR FUTURISTS

By Kody George

Image source: Canva

The discussion of water in space begins with a simple question: What water exists in space?

Most extraterrestrial water in proximity to Earth exists interstitially between particles in the ground, in sheets and in glacier-like formations on the moon, asteroids, comets and Mars (see Figure 1: Space Ice Conceptual Rendering). Further out in the solar system, water has been found in the forms of vapor and highly saline liquid water.

Space explorers, equipped with liquid water from Earth, contribute to a different category of this resource classified as “Recycled Water.”

This leads to the next question: As humans advance their explorations into space, and more specifically to the Moon and Mars, who owns the right to these water resources? Is it first come, first served?

Currently, the law is not clear on how space water can be utilized. The primary treaty governing the activities in space is the Outer Space Treaty of 1967, but it does not clearly address resource extraction. There are legal theories that interpret the Treaty as allowing extraction and appropriation of water. Others interpret the current legal state as prohibiting extraction of space resources, such as water. Due to the legal ambiguity, the most likely prevailing doctrine will be that of prior appropriation — first in time, first in right. This backdrop is important as the privatization of space exploration increasingly consolidates decision making authority into the hands of a few executives. Future generations will suffer the consequences of these decisions.

A number of exploratory missions are concerned with studying space ice and how it is to be utilized in future space missions. The primary uses of space water are expected to be as a life-sustaining resource, supplying liquid water and oxygen to astronauts, and as a fuel source for missions into deep space, separating it into its components, hydrogen and oxygen.

Mining for water in the form of interspatial ice also may be part of greater mining efforts, which includes the harvesting other valuable resources from the Moon, such as helium-3. While these goals are a useful starting point, as futurists, this is a limited view of the possibilities space water presents. There are more innovative, and potentially revolutionary, ways space water could be used here on Earth.

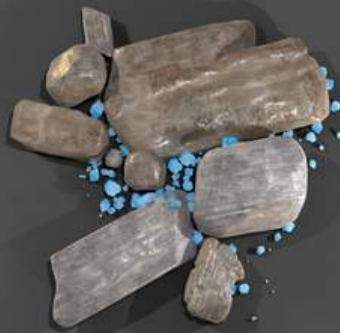
CREATING NEW APPROACHES TO WATER USE ON EARTH

One of those potentially revolutionary uses of space water is a self-contained, life-supporting water recycling system that can purify wastewater, grow food and produce oxygen. The concept is a console that an astronaut could use to sustain themselves on long missions to distant planets. The final product is expected to be compact and lightweight enough to fit on a spacecraft, hardy enough to grow a variety of food, capable of recycling human wastewater, and have a mechanism to capture and produce clean water. When fully developed, it could not only aid in space exploration, but be a solution for water and food security on Earth.

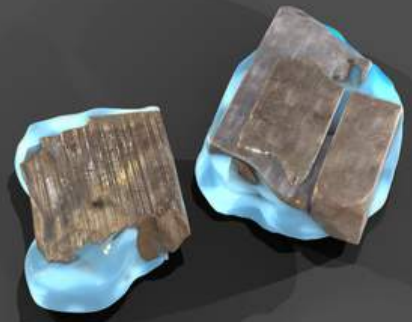
50 μ m



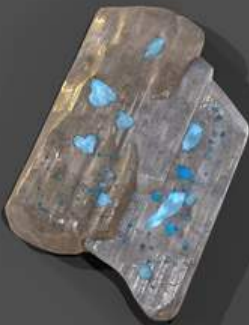
Discrete ice



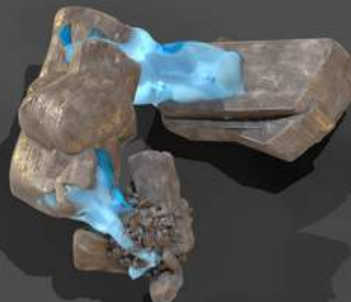
Discrete ice fines



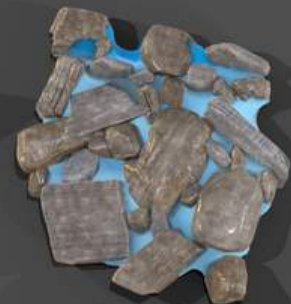
Continuous ice coating (rind)



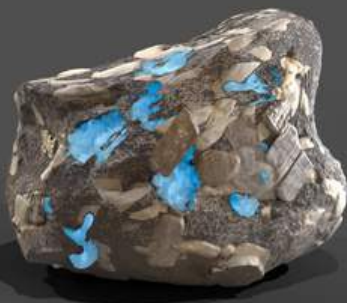
Discontinuous ice coating



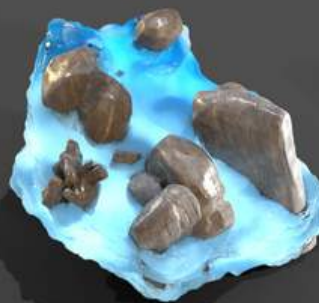
Iceglutinate



Ice-cemented regolith

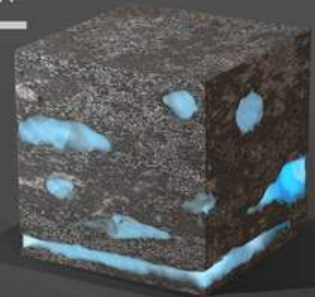


Ice breccia



Ice-matrix breccia

10 m




Massive ice



COLORADO SCHOOL OF MINES
EARTH • ENERGY • ENVIRONMENT

Artwork by Lina Jakaite
strike-dip.com



One of the barriers to technology utilizing recycled water or wastewater is the yuck factor. Generally, populations are psychologically averse to recycling their bodily fluids, even if the quality of water at the end is better than what they currently drink. While this concept has been implemented before, such as in Wichita Falls, Texas, with their toilet-to-tap program (their slogan: “We put the #2 in H2O”), it’s an approach not yet widely utilized. Recycled water could become more commonplace based on changing perceptions spurred by its use in outer space.

Another potential use of space ice is to affect localized changes in small geographic regions. There exists a possibility that ice could be directed through impacts or small rockets to land in the ocean or a reservoir near a city or region experiencing drought and used as a fresh water source. Or, as the ice enters the atmosphere, it could be strategically destroyed at a specific altitude to attempt to create localized weather patterns or as a climate shield. Technology to this effect may be a tool in combating wildfires, droughts, climate change, or localized air quality issues.

A major proposed use of water in space centers around terraforming other celestial bodies. Technology that maximizes water efficiency to terraform Mars may lead to greater agricultural efficiencies here on Earth. Research in terraforming bodies that have liquid water with high salinity could be the gateway to improving desalination technologies and costs. Figuring out how to make water potable in extreme, currently uninhabitable geographies will likely lead

to the development of technology to maximize water efficiencies here on Earth.

DEVELOPING NEW TECHNOLOGY TO HARVEST SPACE WATER

Attempting to utilize extraterrestrial water proximal to Earth that exists as ice and interspatial ice particles has a practical side effect: the development of robots and satellites. Robots, possibly programmed with artificial intelligence, will have the functionality to detect or locate water in minute quantities, analyze its qualities, and extract it. These technologies could be expanded to research, access and extract water even nearer to Earth than the Moon or Mars: in the Arctic or Antarctic. Satellites in space are currently used to gather and analyze data on Earth such as groundwater depletion, water usage in agriculture, ocean temperatures, water pathway changes, etc. Developing probes, rovers, and satellites for a variety of water centric missions in other celestial bodies will continue to increase the capabilities of water monitoring systems for orbit around Earth.

Image source: Canva

NEGATIVE CONSEQUENCES

The future of space water seems to be an investment that hints at enormous payoffs. However, it is wise to approach the conversation with potential negative consequences of extracting and utilizing space water as well.

As a primarily mined resource, the extraction of water in near space will result in permanent land transfigurations. Even though water mined from the South Pole of the Moon would be hidden from Earth's view, it does not lessen the impact. Other efforts, such as terraforming Mars, would result in permanent changes, discernible from Earth's surface. Permanently altering well-preserved environments may carry social and environmental impacts that are difficult to predict and impossible to reverse.

Water transfer is a major concern with space water. It will take inter-basin transfer, water deficits, and water surpluses to a different level. Transfers to outer space will permanently take from Earth sources and systems. Transfers from outer space may eventually add to earth sources but are not yet feasible. The water mined from the Moon or other bodies will permanently change the space environment. These concerns will only grow as the commercialization of outer space grows. The sourcing and legal structure of space water transfers is an important future policy decision that will extend from current Earth based policies.

There also is an element of the unknown. The collective knowledge of the interconnectedness of the space environment is limited. If an entity begins

mining water, transferring water, or using it to transform a celestial body, what will the unintended consequences be? What chains of connected processes will be broken? While living organisms may not be a concern for space water, will there be undetected particles in the water, which, when transferred, could harm humans as the end users? Or will the mining processes used to extract the water pollute the product? Will they create an environmentally harmful byproduct? Asking the right questions will be important as space water is researched.

Image source: Canva

COMMON HERITAGE OF MANKIND DOCTRINE

One theory unique to outer space is what is known as the Common Heritage of Mankind doctrine. Under this legal theory all that is discovered in Outer Space, all its wealth, and the technology developed in its exploration, belongs to all humanity, individually and collectively, both currently alive and yet to be born. No person or entity has claim to it.

While this doctrine may not be adopted in its entirety under the current legal regime, it spurs questions worth asking.

As it applies to water resources, the questions we should be asking as futurists are:

If we find economically minable quantities of water and can access them, should we?

How much water should we take and how much should be left for future generations?

Even if we think it should be regulated, is there a viable method to regulate it?

Should open access be given to the technology used to quantify and access space water?

Is the right to water something that will be guaranteed in space settlements?

While geopolitical factions vie for dominance in outer space, there currently aren't physical land claims or partitions; if water is put to use by a state or private entity, are we opening a door that is better left closed?

Will water and its life and economical purposes be the center of the first conflict in space?



Image source: Canva

While these questions are mostly unanswerable, futurists bear the responsibility of thinking through such issues and influencing policy decisions that will lead to responsible choices.

The potential of water in outer space lies not only in sustaining life, propelling future and further space exploration, but will include the proliferation of technology and ideology influencing water on Earth. The future of water in space is exciting! Now is the time to develop the policies and principles to guide the development and extraction of water in outer space.



Kody George

Kody George holds a master's degree in civil engineering and a juris doctor degree from the University of Alabama. Roll Tide! He is a licensed, practicing attorney in Alaska with the firm Chandler, Falconer, Munson & Cacciola, LLP. His practice currently focuses on municipal law, environmental law, land use, construction law, civil law, and business law; though he hopes to grow the space law portion of his practice. He currently researches and writes about legal and policy issues in outer space, with a special interest in water and resource extraction. He can be reached at kgeorge@bcfaklaw.com.



INTO THE ABYSS: THE CONTROVERSIAL QUEST FOR A GREEN TRANSITION AT THE BOTTOM OF THE SEA

By Mathias Behn Bjørnhof

Image source: Canva

Diving into the depths of the ocean, a controversial quest is unfolding, promising to reshape our green transition while simultaneously raising crucial global concerns. Beneath the waves lies a realm known as "The Area," a treasure trove of minerals that some argue are essential for driving our sustainable future.

Extraction companies and entire nations are venturing into this uncharted territory to extract the valuable materials that could power our green technologies. However, as these ambitious efforts surge forward, pressing questions arise: Can we strike a balance between reaping economic benefits and avoiding ecological calamity? Who bears the responsibility for the potential environmental repercussions?

In a world where deep sea mining could be the next great human endeavor, echoing past resource-driven quests that have defined our history and our planet's future.

In recent years, water has evolved into a resource of increasing contention. Groundwater depletion compels deeper drilling, water scarcity leads to conflicts, oceans grapple with plastic pollution, and climate change breeds extreme weather patterns such as torrential rains and floods. The warming of our oceans stands among the most pressing concerns. What was once assumed a plentiful resource is now a pivotal battleground. Down below the surface of our oceans lures phenomenon akin to a modern gold rush, one that carries the potential to either catalyze the success of the green transition or inflict lasting, dire repercussions upon marine life.



Image source: Canva

From the pioneering descent of the [Trieste into the Mariana Trench](#) in 1960 to James Cameron's more recent [Deapsea Challenger](#) plunge in 2012, we have veered into the abyss, yet understand very little about what goes on down below. As terrestrial exploration has reached its limits, we have turned our gaze towards space, as the logical next step. We are on the verge of a new space era with commercial players vying for attention and recent achievements such as India's moon landing marking significant milestones.

Still, the expansive ocean depths remain as the last uncharted territories on the map. Beneath the ocean's surface lies an enigmatic realm, akin to an alternate planet, an abstract concept just beyond our grasp. This sprawling abyss constitutes nearly 50% of the global seabed, designated as the [Common Heritage of Mankind](#), belonging to everyone and no one all at once.

THE TREASURE CHEST AT THE BOTTOM OF THE SEA

Two years ago, the tiny island nation of [Nauru](#) and Vancouver-based start-up [The Metals Company](#) (THC), led by the charismatic Gerard Barron triggered an obscure clause that forced the hand of the International Seabed Authority (ISA) to decide on the future of deep-sea mining. An industry that has been limited to explorations, research, and tests suddenly stood at a watershed moment. But not without controversy. The deep-sea mining debate is fueled by opposing views from those who fear for marine ecosystems to others who see the treasure chest of rare minerals as necessary to propel the green transition. Minerals hidden in the ocean's depths, untapped for ages, are now taking center stage as companies and nations are coming to understand the growing urgency to obtain these minerals, as well as their scarcity.

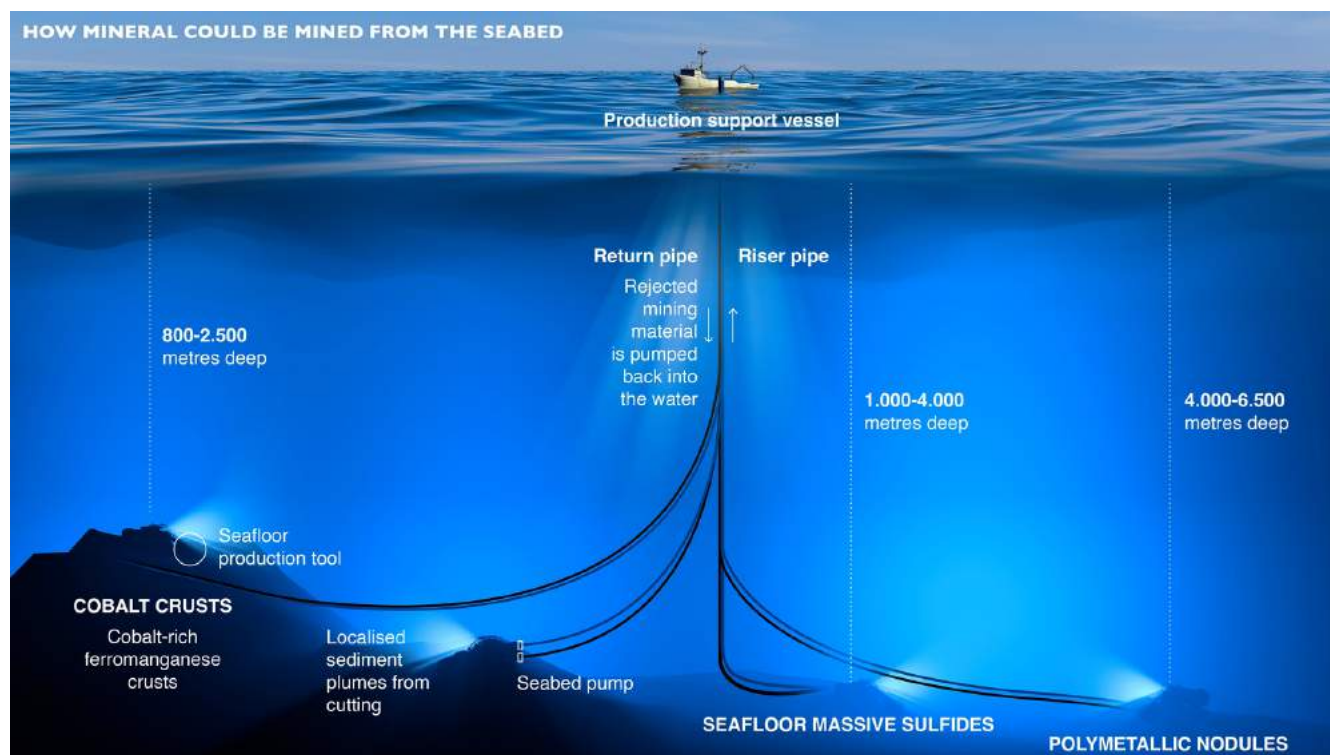


Image source: Shutterstock

Most of the attention is focused on polymetallic nodules – small lumps rich in different metals scattered across the deep ocean floor. Initially identified during the 1872-6 HMS Challenger expedition, which laid the groundwork for modern oceanography, these nodules were believed to stem from volcanic materials but were later found to grow by absorbing metallic compounds from seawater. These nodules formed over millions of years, growing just centimeters, yet are fundamental anchors for various microorganisms and sponges, creating life in the otherwise harsh environment.

Enriched with manganese, nickel, cobalt, and copper, these nodules hold crucial elements for producing electric cars, wind turbines, and solar panels – essential for replacing carbon-emitting vehicles and power sources damaging the climate. The Clarion-Clipperton Zone (CCZ), spans more than 4 million square kilometers from Mexico to Hawaii. It stands out as one of the most abundant repositories of these nodules containing an estimated six times more cobalt and three times more nickel than the total reserves found on land.

The endeavor to pursue deep-sea mining ahead is no small feat. In the depths of the ocean, where the pressure rivals that beneath a multitude of stacked jumbo jets, challenges abound. Navigating these obstacles necessitates the deployment of immense surface ships. These ships will deploy pipelines affixed to automated bulldozers, designed to traverse the abyssal seabed. These bulldozers will diligently gather nodules, which will then be suctioned from the depths and transported back up through five kilometers of water column to the surface.

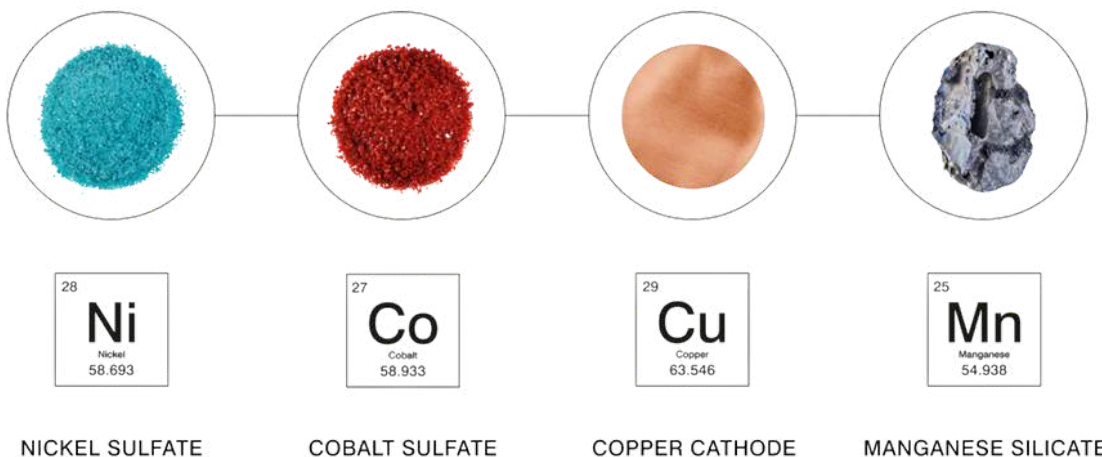




Image source: Canva

DISPUTE OVER DEEP-SEA MINING

Still, just like unchecked land mining, underwater extraction could release harmful sediment and chemicals that harm ocean habitats.

At these depths, where food and energy are limited, life proceeds at an extraordinarily slow rate and populations could take centuries to recover. We might even miss further remarkable discoveries such as the ['immortal' jellyfish](#) that can inspire inventions to improve lives. Without strong protections, the deep sea could risk becoming a Wild West of exploitation, where unrestrained plundering is possible.

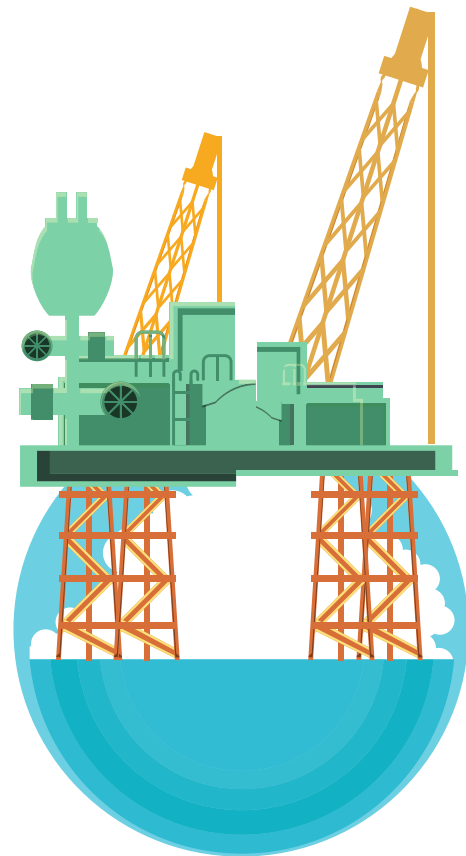
Historically, humanity tends to act first and consider the consequences later. But with the debate roaring, this time it seems that we are trying to figure things out beforehand.

However, we have arrived at a point in time where we might not have the luxury to wait much longer. We are already in a climate crisis. And according to the World Bank (Scientific American), we'll need more than three billion (nonmetric) tons of minerals and metals to deploy the wind, solar and geothermal power required to avoid two degrees Celsius of global warming.

While the allure of deep-sea mining is strong, emerging trends suggest that it might not be the sole answer to our resource needs. Advancements in recycling technology and the rise of innovative batteries utilizing iron and phosphate instead of traditional materials

such as nickel and cobalt could diminish the necessity for underwater extraction. Moreover, efforts to enhance environmental standards for land-based mining could curtail the ecological impact.

Although the complexities of deep-ocean science pose challenges, scientists advocate for more resources to unravel the potential consequences of mining. [The Institute for Sustainable Futures](#) (University of Technology, Sydney) proposes that a shift to 100 percent renewable energy might be feasible through land-based reserves, while the prospect of improving recyclability of metals from discarded electronics (i.e. urban mining) could offer a potential solution. As the world grapples with mounting electronic waste and seeks alternatives to conventional battery materials, the viability of deep-sea mining comes into question.



RACE TO THE BOTTOM HAS BEGUN

Yet Gerard Barron, Chairman and CEO of The Metals Company, is a firm believer in the potential of the industry. Learning from past mistakes, TMC stands at the forefront of the development.

According to international laws, private companies need to team up with a nation-state to do deep-sea mining. For TMC that has meant a partnership with Nauru, a country looking for renewed prosperity after facing economic struggles. Nauru is not alone in its quest. A range of nations, such as India, Japan, Russia, Germany, and Belgium, are actively vying for a stake in the race to mine the deep sea. China has already deployed mine exploration vessels to the Polar Sea, while Norway is evaluating nearby waters as a potential oil alternative. The United States' involvement adds a layer of complexity, keen on securing their mineral supply chains, while aiming to reduce its reliance on China, the dominant player in land-based mining of some of the vital resources. Resource independence and security holds significant sway in the evolving landscape of global power, underscoring the geopolitical significance of deep-sea mining.

As the race to uncover these underwater riches intensifies, the need to strike a balance between resource extraction and ecological preservation becomes ever more crucial. Scientists keep coming back to the fact that we are still oblivious to basic things about life and chemistry in the deep oceans. What kind of creatures live down there? How much carbon is locked away, and could mining risk releasing it? How much disruption can the ecosystem handle?

NARRATIVE WARFARE

We need to engage in deeper public discussions concerning deep sea mining and the narratives surrounding it. Both sides strive to emerge victorious in shaping the narrative, what Barron refers to as narrative warfare. Proponents highlight parallels with land-based mining, underscore the urgency of transitioning to greener practices, and sustaining current lifestyles. Opponents draw attention to the many mysterious creatures of the deep sea and point to the dangers of meddling with the unknown, linking it to the same extractive mistakes that precipitated the climate crisis. An open dialogue is essential to comprehensively deliberate the extensive ramifications of whichever path we choose for our common heritage.

The [International Seabed Authority](#) (ISA) confronts the unique challenge of formulating global ocean mining laws – no other resources are managed this way. The organization recently halted the issuance of deep-sea mining permits until its mining regulations are finalized, which could extend into 2025. This decision aims to establish a unified framework before permitting any international waters mining. If Nauru and TMC adhere to these regulations, deep-sea mining might commence by 2026. Over twenty nations now advocate this delay, in contrast with just a few a years ago.

CONSIDERATIONS FOR FUTURISTS

The trade-off between addressing global warming, biodiversity, and economic interests is immense. To solve one big problem, we risk creating another. This is a truth that all professional futurists must weigh whenever they are helping an organization(s) better understand what lies ahead.



Image source: Canva

Is it a risk we are willing to take and is it worth it? A lot depends on our trust in the seabed authority and in the extraction companies.

Will they stop if it turns out to have major consequences for the marine environment?

And if there is an adverse impact, whose responsibility is it to deal with the consequences?

One thing is certain: Deep-sea mining looms as a veritable minefield with high stakes for our marine ecosystems, our tech-based lifestyles, and the future health of our planet.

SOURCES:

- "På dybt vand" by C. Grunnet & H. Mosbech, Zetland, In deep waters, a series of six articles from 2021-23. [Link](#)
- "Is deep-sea mining a cure for the climate crisis or a curse?" Robin McKie, 2021, The Guardian. [Link](#)
- "Deep-sea mining could soon be approved — how bad is it?" Natasha Gilbert, 2023, Nature. [Link](#)
- "Deep-Sea Mining Could Begin Soon, Regulated or Not," Olive Heffernan, Scientific American, September 1, 2023. [Link](#)
- "Pacific Seabed Mining Delayed as International Agency Finalizes Rules," Eric Lipton, The New York Times, July 23, 2023. [Link](#)
- "What Does the High Seas Treaty Mean for Deep-Sea Mining?" Martha Henriques, BBC Future, 2023. [Link](#)
- "'Immortal Jellyfish' Could Spur Discoveries About Human Aging," Margaret Osborne, Smithsonian Magazine, 2022. [Link](#)



Mathias Behn Bjørnhof

Mathias Behn Bjørnhof is a driven and experienced strategic foresight professional who empowers organizations and individuals to navigate uncertain futures. He founded ANTICIPATE, a strategic foresight consultancy on a mission to empower organizations to anticipate and better prepare for futures characterized by uncertainty, complexity, and disruption. Prior to founding ANTICIPATE, Mathias spent five years in Advisory at the renowned think tank Copenhagen Institute for Futures Studies, successfully guiding multinational corporations, governmental organizations, and start-ups to become futures ready.

A STEEP CHALLENGE: BUILDING A MORE POSITIVE, SUSTAINABLE FUTURE FOR OUR OCEAN'S FISHERIES

By JT Mudge and Stephanie Joly

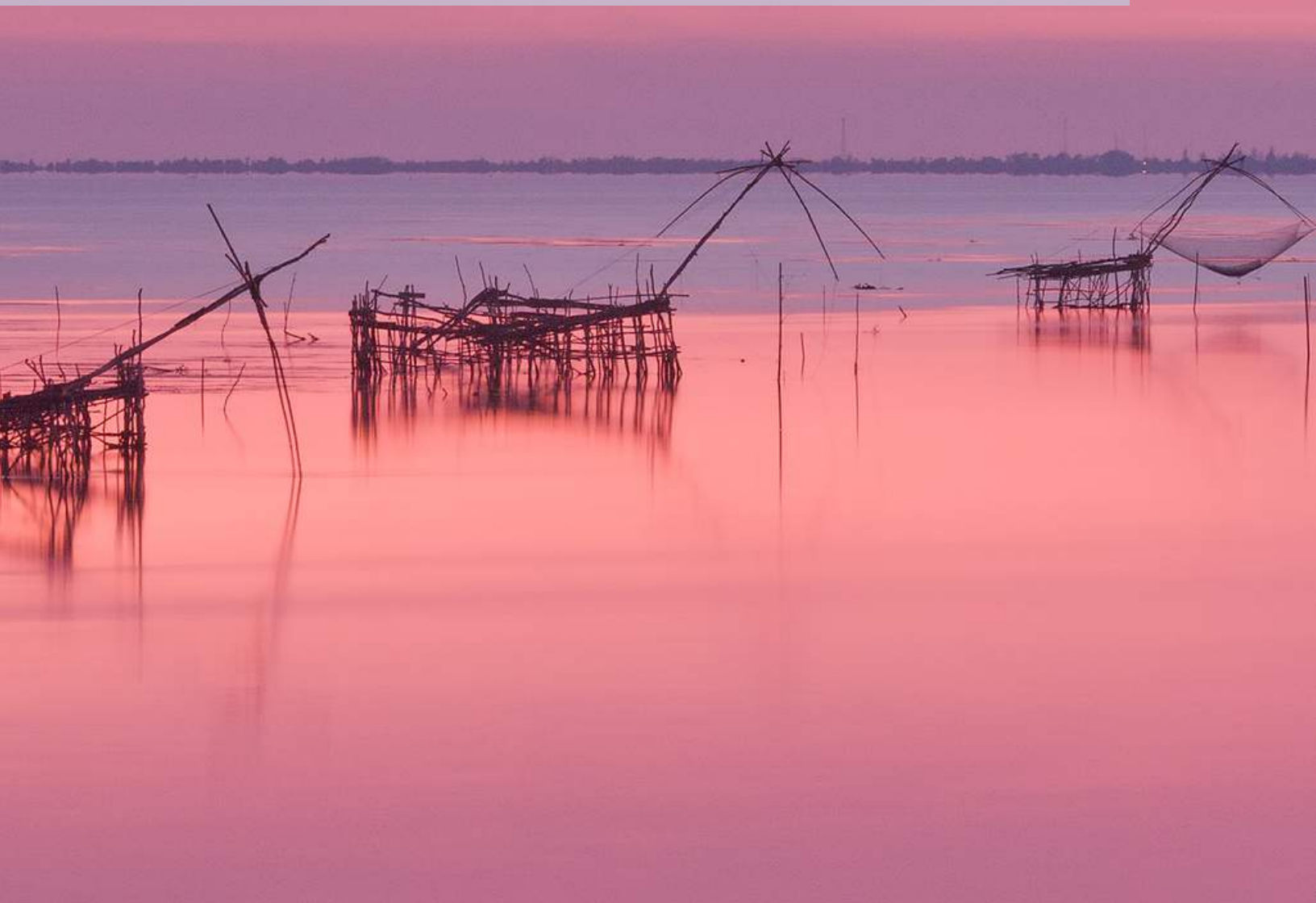


Image source: Canva

If you dive deep into the world of fisheries you will uncover an industry that is as wide as the sea in its complexity and challenges. Few people really know what it takes to get that tuna to your plate, and few realize how many people around the world rely on fish to survive (and how many die in the process). With startling statistics such as [10% of the world facing malnutrition as fish catches decline](#) and [over 100,000 casualties a year in fisheries-related deaths](#), it is clearly a domain in dire need of foresight.

The future is never definitive, even for insightful futurists. Some domains however are so complicated and entrenched with the weight of the past that it may be difficult to enact change.

To say that anticipating and driving change in fisheries is complicated is a dangerous understatement.

The dark side of the domain includes overfishing, shark finning, the capture of endangered species, physical abuse of crew, slavery, and even murder.

Legal fishing has its own challenges with a complicated world of regulations, policies, market forces, certifications, and monitoring.

What's at stake is the future of our oceans and the livelihood and food security for billions of people. Affecting long-term change in such conditions is like being lost at sea, and we haven't yet mentioned warming oceans and climate change.

Simply put: Large-scale commercial fishing is [the most dangerous profession in the world](#), and one of the most complicated.

Determining a strategy for long-term change is not like shooting fish in a barrel, it takes a detailed understanding of all stakeholders and participants. Change is slow, and a change in one part of the system can have a dramatic impact in other areas, both positive and negative.

The easiest way to understand the challenges of change in fisheries is to start with the STEEP framework -- looking at it from the five major drivers of Social, Technology, Economics, Environment, and Politics. Using STEEP gives us a way to organize the different drivers at play both inside and outside of the domain. It provides a baseline understanding that enables us to determine the complexities of change and to find the best opportunities for transformation.



SOCIAL

Fishing is an age-old industry, with pelagic fishing predating the industrial revolution by about 300 years. It is an industry steeped with tradition, both in its culture and methodology. Prime fishing spots are passed down from generation to generation and guarded as family secrets. Entire cultures, economies, and diets are based on these traditions. Fishing is an integral part of life for more than three billion people, and disruptions to the industry, positive or negative, are bound to have significant effects that can't be discounted.

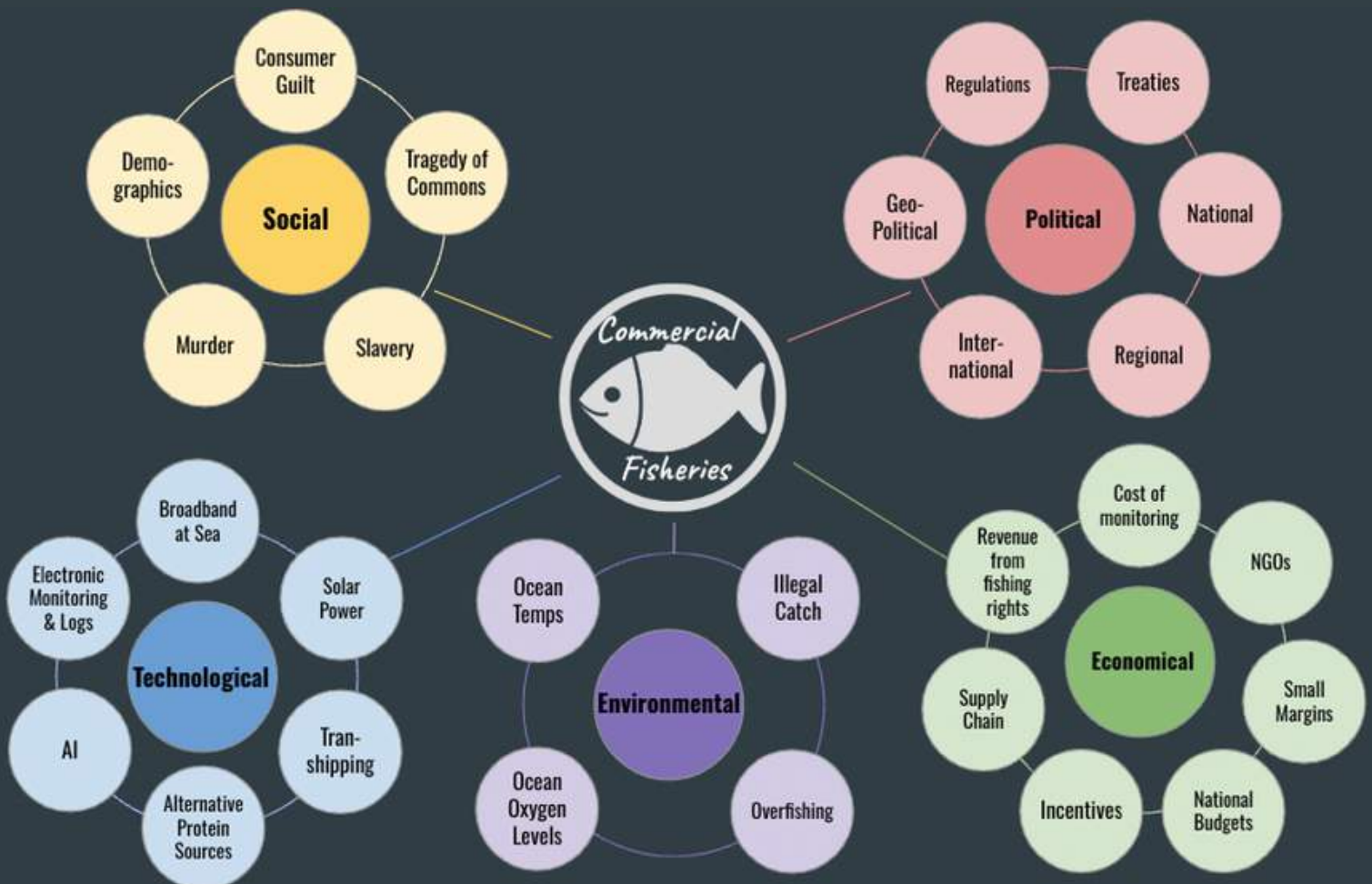
Safety, income, and tradition have a much stronger sway on fishing practices than modern regulations. The question many

fisheries managers face is how to incorporate those needs into policy, and how do policies translate into meaningful social change?

TECHNOLOGICAL

While other domains are seeing rapid improvements from technological advancements, the fishing industry is woefully behind in many areas. While technology is likely to improve both the rate of change and the level of impact in fisheries management, the other STEEP categories often provide friction for technological change, such as economic budgets and a social fear of sharing data.

Some technological advancements however are likely to upturn the industry



STEEP Change in Commercial Fisheries

Social	Technological	Environmental	Economical	Political
IUU - Illegal, Unreported, and Unregulated fishing activities enable a dark market and endanger species and humans	Electronic monitoring and log capabilities are increasing allowing for more data to be collected on fishing practices	Ocean temperature rise causing stress to some species like coral and forcing other species to migrate	Revenue from selling rights to waters Larger hauls = larger profits	National: Each country is responsible for its own fisheries and fishing rights
Human rights issues from unsafe conditions to physical abuse, slavery, and murder	AI is helping to scale EM and find insights in fishing behavior, augmenting human analysts	Oxygen depletion in water is causing species die-off events and a rise in the toxicity of seafood	Affordability of new monitoring equipment A struggling market that provides services to fisheries complicated by independent layers of regulations and rules	Regional: Regional organizations set policies and regulations on members and participating states
Consumers wanting an ethical and sustainable product	Broadband capabilities are increasing allowing for near-real time assessments of activity	Farm and industry chemical run-off into oceans	A shaky foundation for food security	International and NGOs: Influence from these groups shape policy
The importance that fishing has in many cultures - from diets to income and tradition	Alternatives to pelagic fish protein are being developed and entering the market	Increases in large scale fishing and overfishing Harmful interactions with endangered species		Geopolitical: Nations such as China use fishery loopholes to expand their influence and presence.

in the coming years by reducing the costs and increasing the impact of monitoring and improving fishing practices. Increasing electronic monitoring coverage and providing useful data is at the heart of this transformation. Many vessels out at sea have low-to-no Internet bandwidth to send data such as video, logs, and telemetry on their fishing activities. This results in data not being reviewed for months and sometimes years after the activity has taken place, making it virtually impossible to affect real change in behavior.

ENVIRONMENTAL

Fish don't care about country borders or economic zones, but they do care about heat and [oxygen depletion](#).

Regardless of current unregulated fishing activities, the world is in danger of losing not only many species vital to the ecosystems of our oceans, but also a crucial food source for billions of people. According to World Wildlife Fund, [more than 3 billion people in the world rely on wild-caught and farmed seafood as a significant source of animal protein](#), and in economically challenged countries this number is much higher.

For commercial fishers, this poses a huge challenge. They cannot always follow the migrations of different species to cooler and more oxygen-rich waters as their licenses are generally restricted to specific economic zones.

ECONOMICAL

At the heart of the commercial fishing industry is of course money. It can be an endeavor of very low margins for those that put their lives at risk and head out to sea for months at a time (or longer). Some countries rely on fishing as their primary industry and cannot survive without it.

Complicating the situation is the money made from illegal, unreported, and undocumented activity (commonly referred to as IUU). These activities are numerous and include shark finning, drug smuggling, and human trafficking.

According to the research by the Monterey Bay Aquarium, [shark finning alone is a \\$400M+ industry that kills over 100 million sharks each year](#). Transitioning from these practices to more sustainable approaches are often not the most profitable choice for commercial fishers.

A major challenge for those looking to influence the fishing industry towards more environmentally friendly practices is how to make these sustainability measures make economic sense. Premium prices for sustainable products, financial incentives, and increased access to tools and technology that benefit commercial fishers are all possibilities for changing the economic dynamics.

POLITICAL

You don't need a lot of imagination to see how a resource as complicated as migratory sea life can be entrenched in layers of politics from various nations, regional groups, and international organizations.

What might not be front of mind however is how much commercial fishing and the management of fisheries themselves is intertwined with complex global politics.

Countries can buy rights to fish in other countries' economic zones, or even fly the flag of other countries on their vessels to legitimize their activities at sea. These international strategies have very little to do with actual fishing and complicate a domain already mired in politics. Add regulatory policies, import and export requirements, as well as vastly different priorities of each nation state, and you have yourself a gordian knot of political challenges.

WHY CHANGE IS SLOW

When we study change, we find that real change is usually a lot slower than we think. By using STEEP, it is easy to see how a multitude of interconnected points create friction to change such as:

- Multiple layers of regulation
- A lack of technological and data maturity
- Expense of technology and monitoring
- Complicated global market conditions
- Low legitimate profit margins combined with a profitable illegal dark market
- Absolute necessity of fish as a source of protein

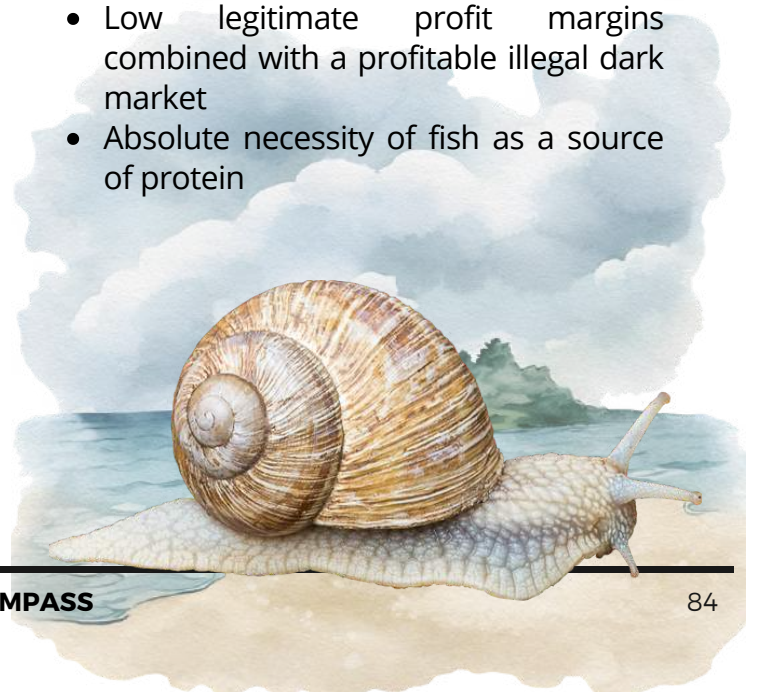




Image source: Canva

ENABLING A SEA CHANGE

Those in the conservation and sustainability spaces are often too removed from the daily realities of commercial fishers, whose behavior they are trying to impact. The disconnect between what is technologically possible versus what is realistic and feasible is huge. If there is to be meaningful social change, there needs to be more conversations between futurists, practitioners, and those at the core of the fishing community.

We can also use STEEP to identify where efforts can be best applied to create change and preferred features.

For example, regulation and technology will fail to gain adoption if economic and social issues are not also addressed. Parts of the current system incentivize slavery, murder, and complacency. It needs to incentivize best practices that not only create more sustainability, but also bring in meaningful profits and wages for those that put their lives on the line. The good news is that these issues are being addressed. Consider:

- Programs that offer education and training on proper handling of species to reduce harm to endangered species and increase the quality of seafood.
- Increased monitoring to certify the good actors, which in turn allows for higher price premiums to be charged by commercial fishers in good standing.
- Big data and AI helping to better understand our changing oceans and allowing industry and government to respond faster and take more informed action.
- Advances in low-cost satellite transmissions, electronic monitoring, solar power, and AI are changing the shape of fisheries technology and could well introduce new tools for management if economic incentives and social barriers such as privacy are also addressed.

In such a complicated and slow to change industry, foresight is desperately needed to help all parties involved in the commercial fishing of our oceans and seas forge a new path toward preferable futures where there is still enough food in our seas, where species can thrive and not be endangered, and where slavery, abuse, and murder are virtually eliminated.

FURTHER READING

Want to dive deeper? Check out some of these podcasts.

- The Outlaw Ocean - <https://www.theoutlawocean.com/the-outlaw-ocean-podcast/>
- Lost at Sea - <https://www.bbcpodcasts.com/listen/lost-at-sea/>
- Better Worlds - <https://open.spotify.com/show/1ETnAZy4d3TLSOPv0GuHLO>



Stephanie Joly



JT Mudge

JT Mudge and Stephanie Joly work in sustainability and data strategy at the firm productOps, where they co-developed the firm's sustainability practice.

Stephanie is a strategist, analyst, and consultant specializing in data and sustainability. She is currently involved in multiple data-centric projects focused on driving innovation in fishery sustainability.

JT is a professional futurist and adjunct professor at the University of Houston teaching Social Change in the masters of foresight program. He will be presenting on the Futures of Fisheries at the World Future Studies Federation (WFSF) conference this fall in Paris, France.



BLUE-GREEN INFRASTRUCTURE THE FIRST STEP TOWARD BETTER MANAGING WATER RESOURCES

Throughout our world, major cities, where more than half of the world's people live, are facing a range of issues related to water, from water scarcity to surfaces and infrastructure unable to catch water, leading to flooding. In reimagining our cities of the future, foresight experts and civil engineers are turning to blue-green infrastructure and regenerative design to construct the built environment to improve societal resilience, restore planetary health and regenerate ecological systems.

By Stephen Dupont

Top view The largest water desalination facility in the world, Hadera Israel
Image Source: Shutterstock

Too much water. Too little water.

The American-Canadian speculative fiction writer, William Gibson, author of the sci-fi classic *Neuromancer*, is quoted as saying, "The future is already here – it's just not very evenly distributed."

And water, like the future, is already here. However, it's not evenly distributed either. On a planet where 70% of the surface is covered by water, there are places in even the world's richest countries, where people are desperate for clean drinking water. And in fact, we are so desperate for clean water, we give consideration to drilling in our oceans to reach [underground aquifers](#), [towing icebergs from Antarctica to arid regions](#), and [building pipelines from Lake Superior to the American Southwest](#), and [building more desalination plants](#).

As we contemplate the impact of climate change, and the lack of urgency among humans to truly address the problem, someone from a dark corner says, "If we can put a person on the Moon, surely we can engineer our way out of this challenge."

When we think of the term "engineering," our minds often jump immediately to images of great structures – dams, bridges, sea walls, levies, canal systems, desalination plants, and other "gray" structures that harness, store and control water.

But for a professional futurist and a certified civil engineer who work for ARUP in London, the answer to addressing some of our world's most challenging water issues may not necessarily be about pouring more concrete or placing more steel girders into place.



Image source: Canva

Instead, the answer may lie in learning to love our planet again by allowing nature to do the work instead.

Lola Bushnell is a Senior Sustainable Futures Strategist, and Rosamund “Ros” Vose, CEng, MICE, is a Senior Foresight Consultant, who both think about water, as well as other infrastructure issues, for ARUP’s clients. ARUP is a British [multinational professional services](#) firm headquartered in [London](#) that provides [design, engineering, architecture, planning](#), and advisory services across every aspect of the [built environment](#). It employs about 17,000 people in more than 90 offices across 35 countries, and has participated in projects in over 160 countries.

MANAGING UNCERTAINTY IN WATER

Many [cities](#) across the globe, including London, face long-term water shortages. Over the past several years, cities in the American West, such as Las Vegas, Phoenix, and Los Angeles, have faced a growing crisis as the Colorado River, which feeds reservoirs such as Lake Mead and Lake Powell, started to drop dramatically in the face of a deepening drought. And yet, after an extraordinary winter with record snowfalls, those very same reservoirs have increased dramatically, creating a sense of relief for millions.

The problem is in the not knowing what to expect anymore. Too little water, then too much water. And more importantly, cities and regions that not prepared for extreme rainfall/snowfall events or extreme drought. For example, in November 2022, parts of [Buffalo, NY](#), were buried under 6 feet of snow that fell in just 24 hours.



Lola Bushnell, ARUP



Ros Vose, ARUP



Due to severe water scarcity, local residents fill water in huge plastic containers from a water tanker in , Maharashtra, India
Image Source: Shutterstock



In September 2023, [Storm Daniel](#) produced extreme rainfall in parts of Libya, leading to flash flooding and the failure of two dams that has claimed more than 5,000 lives so far (with an additional 10,000 people still unaccounted for).

It's these types of events that are compelling governments and organizations to consider long-term strategies to better manage water resources. Consider for example, a plan issued by the Biden-Harris Administration in the United States on [global water security](#).

In England, Vose points to a document published in April 2022 by Ofwat (the Water Services Regulation Authority), the economic regulator of the water and wastewater sectors in England and Wales.

[PR24 and Beyond: Final Guidance on Long-Term Delivery Strategies](#) provides strategic guidance for UK water companies in developing plans for the long-term (25-years) water delivery. These strategies outline long-term outcomes for water companies, and how they will deliver them in a range of plausible futures.


"It sets expectations for English water companies on how they will manage uncertainty through things such as scenarios and adaptive planning," said Vose.

When Bushnell and Vose think about water issues, certainly they think about the intensification of weather. But there are other issues to consider, as well, especially for urban areas, such as London.

"Most of our urban surfaces are impermeable (buildings, roads, etc.), so they need good drainage systems to mitigate surface flooding during rainfall events," said Bushnell, "and most of those drainage systems were set up based on weather patterns that were established decades ago. Now, of course, climate change is changing those weather patterns. This in turn is leading to severe flooding in cities around the world as the frequency and severity of storms is increasing beyond the capacity of existing infrastructure."

These impermeable surfaces also prevent the recharge of groundwater supplies. In some cities, including Mexico City, Jakarta and Tehran, this is causing land to sink by as much as [50 cm \(20 inches\) per year](#) as groundwater is extracted faster than it is replenished. In places desperate for water, residents watch as that rainwater runs off due to impermeable surfaces and of soil degradation.

Heathy soils are full of life, from roots and mycorrhizal networks to earthworms and insects. This gives them structure and aeration that allows for water to be soaked up. Yet there are many locations throughout the planet that are experiencing declining soil quality, noted Bushnell, due to a range of stressors, from unsustainable grazing



and agricultural practices to deforestation and extreme heat, all of which cause soil to become lifeless, compacted, and unable to absorb water. Without root systems, it is also vulnerable to erosion.

“So when rainfall does come,” said Bushnell, “it runs off very quickly, causing flooding downstream and not recharging groundwater supplies. We’re seeing this in many parts of the UK that are still experiencing drought conditions. Look at California. It’s been in a drought for years and recently received a ton of snow and rain this winter. The reservoirs recharging, but the groundwater didn’t, because there is little to no rainwater harvesting.”

What the average person may not understand is “you can have lots of rain and lots of water nearby, and still face a multi-year drought,” Bushnell added.

And therein lies the key: Managing water resources is having the right amount of water exactly where and when you need it. This is where foresight can play a role in helping water companies re-imagine how to achieve this vision, and it’s here where Bushnell and Vose typically start in building scenarios for their clients.

Image source: Canva

NATURE-BASED SOLUTIONS

Both Bushnell and Vose feel there is a tremendous opportunity for water companies and organizations that provide water services to explore nature-based solutions to managing water, which would not only enhance the health of nearby ecosystems but strengthen the resilience of the water system.

“On the positive side, I think there is so much opportunity to collaboratively work with stakeholders at the catchment level – to use nature-based solutions that help rebuild resilience in our ecosystems,” said Vose.

Bushnell agreed, pointing to the value of blue-green infrastructure as an opportunity to managing water resources better. Water that flows through aquifers, rivers and lakes is called blue water. Green water is water stored in biomass, such as plants (forests, corn fields, etc.) and soil. Because water flows between blue and green water sources, when one source is impacted, such as by drought or deforestation, the other sources are impacted as well.

“That’s how healthy soils, vegetation with deep root systems, and forests regulate the water cycle and buffers against shocks and extreme weather,” said Bushnell, “but they also play a role in driving regional and global water cycles. When trees are transpiring, putting water vapor up into the air, that’s really what’s building up a lot of our clouds. For example, the Amazon produces around a [third to half of its own rainfall](#), but reducing forest cover to 40% of its potential would reduce rainfall in areas that are over 3,200 km away, while complete deforestation would reduce rainfall in the US Midwest.”

So, when a large ecosystem such as the Amazon is transformed – large swaths of rainforest cleared for farming or cattle grazing – the impact on the global water cycle can change, too.

A recent report published by ARUP, [Designing for Planetary Boundary Cities](#), paints a stark picture about the future of our planet’s freshwater resources. The report notes:

- Climate resilient groundwater is being depleted – An estimated 38% of irrigated land depends upon groundwater globally. As a result, 13 of the largest 37 aquifers in the world – considered reliable sources of water – are classified as significantly stressed.
- Water sources are disappearing – by 2050, global water demand is conservatively projected to increase by 55% yet shifts in weather patterns brought about by climate change and land-system change are expected to exacerbate shortages. Note: Approximately 75% of the accessible freshwater comes from forests and 90% of the world’s cities rely on forested watersheds for their water supply.
- Water quality is declining – In addition to the decline in available freshwater, the global quality of that which remains is deteriorating. An estimated 80% of all industrial and municipal wastewater is released to the environment without treatment.

“We’ve reached a tipping point where parts of the Amazon could become dryland savanna,” said Bushnell. “We see this in other arid environments, where resource degradation has been ongoing, where

there's been lots of deforestation, poor grazing practices, etc., and that in turn affects the soil and its ability to hold water, which humidifies and cools and area."

"When these soils become degraded, they're unable to capture and store rainfall," Bushnell added.

REGENERATING LANDSCAPES

But change is possible. And sometimes, it doesn't take as long as one may think. Bushnell points to the [Paani Foundation's Water Cup Competition](#) which transformed the Maharashtra region in southern India that typically receives only 8-12 inches of rain a year and routinely faces water scarcity. During the dry season, it was not uncommon for trucks to haul in water for drinking and cooking.

With the guidance of water and environmental engineers, a highly effective system of ditches and ponds was built to capture and store rainfall at higher elevations. This system helped to restore groundwater tables at lower levels within just 45 days. Now, villages in this region enjoy drinkable water all year long, and they have water for their crops and livestock even during the dry season. More importantly, transforming this system is transforming the culture of the region – residents no longer have to leave their homes for larger cities in search of economic opportunity or drinking water.

"The competition resulted in other benefits as well," said Bushnell. "The water capture and storage system reduced the risk of flooding downstream during the rainy

Paani Foundation a people's movement to tackle drought in rural village Salunkwadi, Ambajogai, Beed, Maharashtra, India, Southeast Asia.

Image Source: Shutterstock

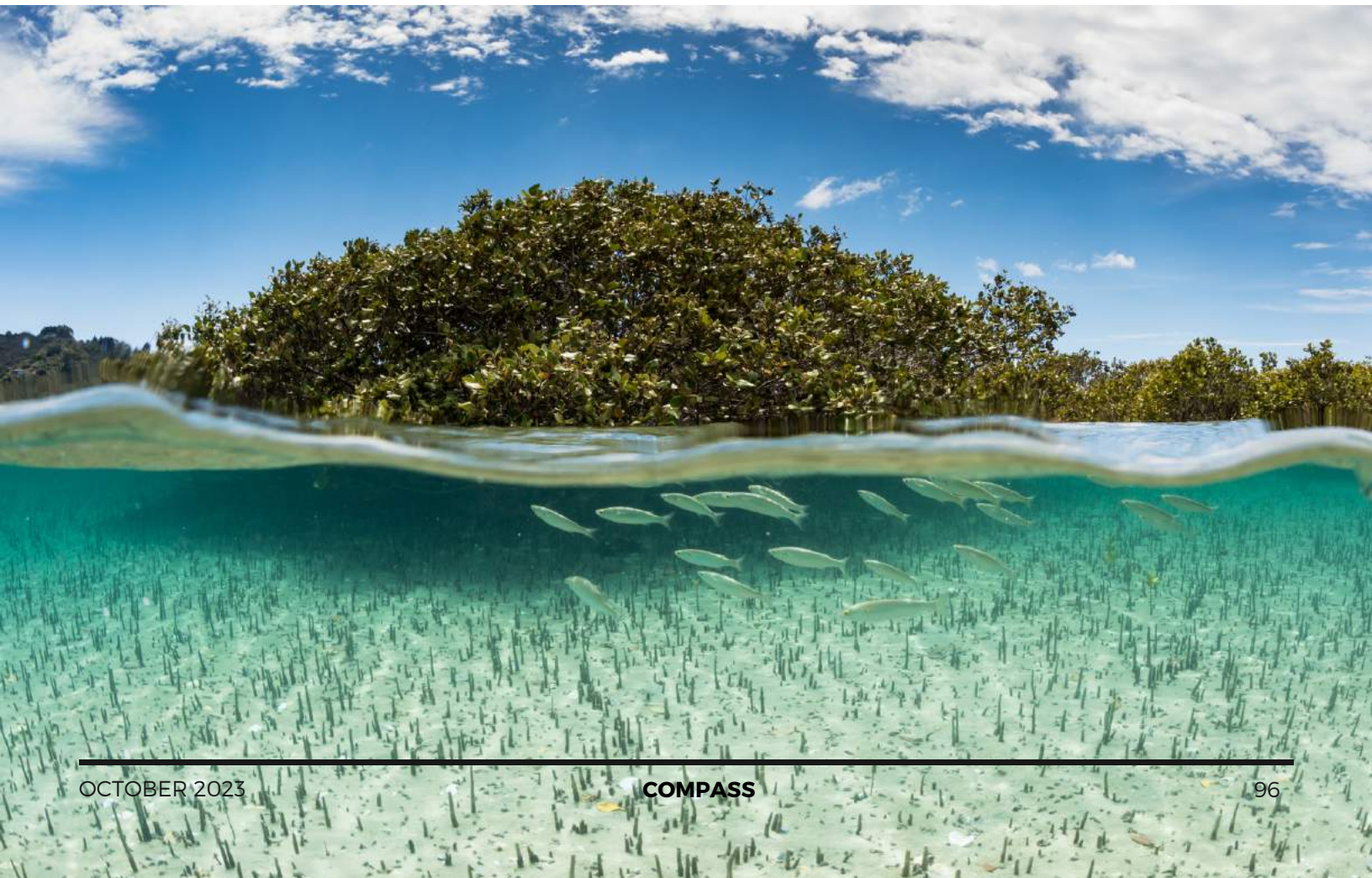


season and the region's environment changed, from a dry, brown arid landscape to a visibly greener landscape. It offers a good example of how capturing and storing water can help nature and thus, rehabilitate the wider hydrological system."

Creating new water capture and storage systems can help an urban area become more resilient to large rainfall events. During the summer of 2022, the U.S. experienced six 1,000-year rainfall events in various locations within a matter of weeks. Natural capture and storage systems could help reduce the impact of such events, by reducing breaches to city sewer systems, preventing flood waters from contaminating city wells, and reducing pollutant runoff, while at the same time, creating an opportunity to restore groundwater tables.

CAN WE ENGINEER OUR WAY OUT OF THIS MESS?

As we think about some of the truly massive issues facing humanity that involve water, Bushnell and Vose emphasize that while we need to think globally and think big, it's just as important, to act locally. They point to policy decisions, such as the [Clean Water Act](#) in the United States, that had a significant impact on cleaning America's lakes, rivers, and ponds. They point also to [investments in mangroves](#), which are potent buffering system in reducing the impact of powerful waves on shoreline coasts while providing habitat for fish. Then there's the investment of New York City in [restoring oyster bars](#), which makes shorelines more resistant to storm surges while enhancing the health of the Hudson River.



While Vose favors blue-green infrastructure over traditional infrastructure, there still remains the perception that gray infrastructure is more effective. That's partly because it's more visible, and it's easier to model the impact of gray infrastructure on a system.

"Gray infrastructure is more easily quantifiable," said Bushnell. "We need to become better at modeling natural systems to better account for, and monitor, those solutions. There's currently a strong investor preference for gray infrastructure solutions that are easily quantifiable."

This is where technology can play a significant role. Digital technology and AI can be used to better understand where various cities and regions are at and where they can go in terms of securing their water resources.

"We can already see what's happening with a number of cities facing Day Zero water (when no meaningful water comes out of the water taps)," said Bushnell. "We're already up against drought and expanding dry land round the world. It is happening. But at the same time, we also see the solutions. So let's understand how things are changing and let's amplify what's working."

THE VALUE WE PLACE ON WATER

What value do we place on water?

At the end of the day, Bushnell and Vose say it will take far more than natural solutions to solve our water problems.



Flood control dam in an urban wetlands, part of a natural storm water control and pollution mitigation system

Image Source: Shutterstock

"I think for me, one of the biggest solutions we could have is reducing our water use through more social mechanisms, especially involving education, building understanding, and using carrot and stick approaches," said Vose.

"For example, here in England, some people have a smart water meter. But a lot of people don't, so they don't know how much water they're using," said Vose. "There is no financial incentive to do really simple things such as water harvesting for gardens."

Bushnell and Vose advise other professional futurists to not overlook the important role that freshwater plays in the health of our communities and cities, but the health of our planet. The problem of freshwater security and scarcity is real and it's coming closer and closer to home – including wealthy regions that just a few years ago couldn't have imagined having such issues.

As Bushnell and Vose point out, our freshwater resources can be restored. In fact, some of the most effective means of restoring the health of our freshwater systems are solutions that indigenous civilizations mastered hundreds of years ago. The question comes down to whether we, as citizens of this planet, are ready to act. And act now.



Stephen Dupont

Stephen Dupont serves as the editor of Compass magazine. To reach him with a comment about this article or Compass magazine, visit his LinkedIn page at <https://www.linkedin/in/stephendupont>.

MANAGING OUR RETREAT FROM TOO MUCH WATER AND TOO LITTLE

By Dmitriy Zakharov



Image source: Canva

Water is the ultimate “can’t live with it, can’t live without it.” It makes complete sense, of course: our bodies are mostly made up of the stuff, so we don’t just need it for our very existence – it is our existence, or at least [roughly 60-80%](#) of it.

But water by itself is dead. It requires all those impurities, in particular carbon chief among them, to make us and all other life as we know it. And the adage about too much of a good thing holds true: whether at a micro-scale ([drowning](#) claims ~4,000 per year in the United States and is the leading cause of death among children ages 1-4 years) or a macro-scale (flooding is “[our nation’s most frequent and costly natural disaster](#)”), water in excess brings death and damage.

The good news is that, given our most intimate symbiotic relationship with water, we have plenty of experience in managing it. Every fixed human habitation of any size requires a predictable source of water... and a reasonable chance of getting out of its way should it exceed its usual limits.

For example, the ancient Egyptians elevated the Nile River to the status of a god, with the priests’ [ability to gauge the extent of its annual flooding](#) becoming a critical source of their – and the pharaoh’s – legitimacy. In more recent times, we have [built great cities upon lands reclaimed from the sea](#) and have [made the Chicago River run backwards](#).

The bad news is that our relationship with water is changing – and not just because hydration, long understood to be a universal experience, is now [apparently a status symbol](#).



Image source: Canva

Anthropogenic climate change is [doing a number](#) on the global water cycle, as rising temperatures cause more – and more intense – storms. Sea level rise exacerbates the impacts of such storms in low-lying coastal locations while also increasing the incidence of “[sunny-day flooding](#)” in which the tides are high enough to inundate such areas.

Much like Lando Calrissian’s ill-fated deal with Darth Vader at Cloud City (The Empire Strikes Back), our live-and-let-live arrangement with water is “[getting worse all the time](#),” and we are left to pray that it does not get [altered any further](#).

ATTRACTION AND REPULSION

Even as attempts continue in fits and starts to limit the scope of impacts through reductions in greenhouse gas emissions, another climate-related concept is increasingly entering the common lexicon: [managed retreat](#).

It is a useful, if somewhat euphemistic, term. The “managed” modifier seeks to reassure us that what is being described is a calm, orderly, and rational process, rather than the panicked fleeing with which retreats are often associated. But a deliberate and protracted withdrawal is not necessarily a less painful one. Seeing the writing on the wall far in advance may simply prolong the dread of impending loss.

Still, carrying on as usual is hardly a better alternative. While many revert to denialism as their means of coping with the prospect of the world to come being a much stormier place than the world they’ve known, such escapism is a stalling tactic at

best. Water does not care about your feelings, and the awesome power with which it arrives has a way of [spurring action even among skeptics](#).

Further complicating matters is that fact that managed retreat is not a simple one-way process. While most of the focus is on movement away from low-lying, high-hazard areas along the coasts (40% of the U.S. population [lives in a coastal area](#)), the concept also encompasses a range of other push and pull forces.

In some places, climate change results not in too much water but in not enough, worsening droughts and fires.

Retreat from [the wildland-urban interface](#) in places such as California and the Pacific Northwest might mean moving toward the coastline, which is [not prone to tropical storms](#) and much of which features [sea cliffs and bluffs](#) that blunt some of the impacts of sea level rise. Meanwhile, rising temperatures threaten to render some places unbearably hot, spurring [outmigration to places that are cooler but also wetter](#), such as the Great Lakes region ([Duluth, Minnesota](#), anyone?)

A PERPENDICULAR WAVE

Taking in the broad sweep of relevant signals, we have every reason to expect that managed retreat will be an ever-growing feature of life in the coming decades. It is a straightforward and exceedingly plausible first-order implication of climate change, that global driver with few antecedents in human history. But what of second- and third-order implications? How might we make sense of the ways in which they could shape various futures?

Image source: Canva

Everyone has their own preferred frameworks for organizing their thoughts, but one that seems apt here is [Alvin Toffler's three waves](#) – and not just for the water metaphor. Even if we are able to greatly mitigate climate change and its impacts, it is likely to be a phenomenon on the same order of consequence as the agricultural, industrial, and information revolutions. Given that these three waves continue to keep our civilization afloat, it is worth contemplating how managed retreat might intersect with them. What follows is a quick and U.S.-centric, but fairly generalizable, attempt.

THE RISE OF NIMBLE FOOD?

The story of modern agribusiness has largely been one of consolidation, [both geographically and organizationally](#): “Crop production is heavily concentrated in certain areas, larger farms are getting larger, while the number of smaller operations is decreasing, and crop diversity is declining.” Sprawling global supply chains have evolved to move food from centers of supply to centers of demand.

The prospect of climate-driven disruptions to supply [has been covered](#) with appropriate rigor and alarm. Less common are assessments of what major changes in the centers of demand, whether seasonally or permanently, might bode – much less a holistic look at the entire system.

Simple changes in what is grown where are likely to be necessary but not sufficient. Reducing perishability becomes an increasing priority, ideally without sacrificing taste, nutrition, or sustainability.

Enter [nanoencapsulation and other new techniques](#) for stretching shelf life without resorting to questionable additives or freeze-drying.

For areas seeing an influx of climate migrants, [hydroponics](#) could offer a means of dealing with spikes in demand. While urban vertical farming has long drawn rightful skepticism as a poor use of scarce and desirable real estate, the rise of mass remote work and the steep challenges in converting office space to residential [may change the calculus](#).

Going further, [synthetic biology holds great promise](#) for harnessing the power of fungus and microbes to create lab-grown meat, milk, and other foodstuffs at scale without all the externalities of livestock. And, if it takes awhile to get those spun up, then in the meantime there is always that most ubiquitous source of calories: [bugs!](#)



Image source: Canva

IF THEY COME, YOU WILL BUILD IT

Much like agriculture, modern manufacturing has to a great extent been defined by increasing [specialization, centralization, and consolidation](#) in location – from cottages to factories, from neighborhoods to industrially zoned areas and industrial parks – and in [corporate structure](#).

That model has been effective at producing staggering amounts of consumer goods, and while large swaths of American industry have now been off-shored and domestic production replaced with a [service economy](#) that [relies on imports](#), the cultural penchant for materialism has proven sticky. Or at least it did until the Covid-19 pandemic, when the long-discussed values shift from collecting items to acquiring experiences seems to have [hit an inflection point](#).

A population on the move due to managed retreat is likely one for whom accumulation of personal property is both less desirable and less practical. [Existing signals](#) of Everything-as-a-Service and ‘the sharing economy’ kick into overdrive when ownership increasingly becomes a burden and the urge toward sustainability puts disposable items in ever-greater disfavor.

And yet... lots of stuff will still need to get made. Thanks to continued innovations in additive manufacturing and ‘smart’ infrastructure, true [distributed manufacturing](#) becomes not just possible but preferred for many products. We’re going to have to build more defensible, resilient housing for those in retreat – we may as well locate the 3D printers to serve them within convenient proximity. And for those industrial centers that cannot be distributed,



Image source: Canva

a mirror image starts looking plausible: [the return of company towns](#), far enough away to avoid the impacts of immediate proximity, but close enough (and [dense enough](#)) to make it feasible to fortify the entire complex.

INFORMATION COAGULATION

Unlike the first two waves, the information revolution has been a process of decentralization, one defined by the propagation of technology that makes creation, transmission, and reception of information faster and easier. Managed retreat can hardly make the information itself any more distributed. Wherever people might go, ‘the cloud’ will be there.

At the same time, while cheap gasoline and airfares have enabled mass enjoyment of some degree of tourism, most Americans have stayed [close to home](#) and [close to family](#). In 2015, the New York Times famously reported that [“the typical American lives only 18 miles from mom.”](#)

If this historical cohesion experiences sharp migratory shocks, it won't just be the 'very online' and the digital nomads whose dominant experiences of community will be intermediated by IT – it will be the norm. New IT will proliferate to facilitate this, sure, like ['extended reality'](#) and [ubiquitous satellite phones](#) and every last school play and Little League match being [streamed using 5G](#). But it is the social innovations that will prove most impactful. Diaspora democracy is [complex and often fraught](#), and that's with distance, assimilation, and other barriers softening its edges. Snowbirds and other seasonal migrants have always been a feature of American life, but they have been too few in number to dictate the terms of civic engagement. If the idea of permanent residence loses its normativity, and 'home' is where the heart is but the body is not, how does community decision-making function? Might time-based voteshares, virtual caucuses, and physical – or even digital – proxies become a feature of governance mechanisms from the PTA on up?

ALL – AND NONE – OF THE ABOVE

As is so often the case with futures, the question to be asked about these potentialities is not "if" but "to what extent?" Which ones will be mere blips and which ones will define the times? When they interact, like waves interfering with one another, which ones will create peaks and troughs and which will cancel each other out?

On a more local level, these futures will be shaped by the ways in which some areas go quietly into the night while others rage against the dying of the light.

What potential havens will seek to ride the destructive wave, embracing their newfound status as [climate refuges](#), and which will [try to stay off climate migrants' radar](#)?

All this and more will determine whether a managed retreat becomes a rout.



Dmitriy Zakharov

Dmitriy Zakharov is a consulting futurist at Toffler Associates. He is the author of [Future-Fluent: How Organizations Use Foresight to Thrive in Turbulent Times](#) (New Degree Press 2021). He is deeply grateful to Catherine Cosgrove, Jason Gibson, Maggie Greyson, and Wendy Schultz for their insights at an 'open space' ideation session on this topic at the APF Gathering in Washington, D.C. this summer.



THE IMPACT OF SNOW ON MANAGING WATER RESOURCES

By Stephen Dupont

Alpine skiing in Alta, Utah
Image Source: Shutterstock

When you're at the top of a mountain during the winter, such as the top of Peak 8 at Breckenridge in Colorado, and you can see snow-capped mountains for miles and miles, one thought that may come to mind is "Look at all of that snow! I would love to ski all of them!"

But what rarely, if ever, goes through your head is, "The snow I'm about to ski is going to be someone's drinking water someday, or will irrigate crop land, or will keep the millions of pine and aspen that I see, hydrated over the course of a hot, searing summer."

The water that we depend upon comes in many forms. And for millions of people, one of those, is snow. Whether we love it, or sometimes hate it, throughout the world, in both the Northern and Southern Hemispheres, snow plays a vital role in storing water for eventual use in another state, such as a liquid.

Unfortunately, our winters are in danger. It's a significant trend that professional futurists should consider as they think about scenarios involving water as well as other STEEP-V drivers of change.

The problem is that winters in the United States are getting shorter (as well as in other parts of the world). As reported by [Eric Margolis](#) in his February 14, 2022 article, "How Many Ski Seasons Are Left?," published by The New Republic magazine, the long-term outlook for winter across the globe looks dim. Concerning the American West, Margolis writes:

"The American West has also been hit hard, with the mountains there [losing 20 percent of their snowpack](#) since the 1970s. By the end of the century, the Rockies, the Sierra Nevada, and the Cascades could stand to lose another 50 percent. Mario Molina, executive director at nonprofit climate advocacy group [Protect Our Winters \(POW\)](#), based in Boulder, Colorado, said these changes are already apparent. "What we see is the unpredictability of the winter season across the country. We're no longer able to rely on the onset of winter toward the end of November," said Molina. The unthinkable happened this past December [when fires broke out in Boulder county](#).

[Dr. David Hill](#) and [Dr. Andrew Schwartz](#) are scientists who specialize in studying snow. They serve on an advisory board of scientists to Protect Our Winters.

Hill is a professor at Oregon State University and a National Geographic Explorer. He has degrees in aerospace engineering (UIUC) and civil and environmental engineering (UC Berkeley). For over 25 years, he has studied how water behaves from snowy mountain headwaters to the coast. He collaborates with other scientists interested in water's response to climate drivers and works with stakeholders to provide information on water resources.

Schwartz is the lead scientist and station manager at the University of California-Berkeley [Central Sierra Snow Laboratory](#), whose research interests include developing a better understanding of snowfall and snowpack physical processes and the impact of climate change on those processes.

While Hill and Schwartz tend to focus their attention on what will happen in our coming few winters, both are very concerned about the long-term trend (10 to 20 years out) for snowpack throughout the Western United States. Their understanding offers a signal of what's in store for snowpack in other mountainous areas around the world.

There are many ways to think of snow. It's something that people enjoy skiing on and playing with. From an economic perspective, it attracts tourists to ski towns. From a farming perspective, snow provides moisture to croplands. And for those who manage water, snow is a natural way of storing water.

HOW CRITICAL IS SNOW?

"Here in California," said Schwartz, "when we talk about the amount of water we get from snow, the estimate that's thrown around is about 30%. But some people believe that could be up to half (50%) of the state's water, depending upon groundwater replenishment."

"So, when the water that becomes available later in the year for things like agriculture, and for cities and towns," Schwartz added, "we need that snow to replenish the water we're releasing from reservoirs earlier in the year that hopefully have been filled with rainfall."

"The total water storage around the globe in lakes is about 200,000 cubic kilometers," said Hill. "The total water storage globally, in surface water reservoirs is about 4,000 cubic kilometers. Now, in the northern hemisphere, peak snow storage runs about 3,000 cubic kilometers of water



Dr. David Hill



Dr. Andrew Schwartz



North Sister 2023
Image Credit: Doug Holdt



North Sister 20212
Image Credit: Tyler Deboodt



Coe Gacier Mt Hood 2022
Image Credit: Tyler Deboodt



Coe Gacier Mt Hood 2012
Image Credit: Tyler Deboodt

equivalent. So, when the snowpack starts to melt, we are basically doubling the amount of water that needs to be stored, and we don't have the capacity to store it. The storage aspect of snow is huge."

"When precipitation comes down in the form of rain and not snow, or when we have warmer than normal springs, in which the snow melts earlier, that water has nowhere to go," Hill added.

The problem is, noted Schwartz, "as we've seen with Lake Powell and Lake Mead, even if the infrastructure is there, that doesn't necessarily mean that precipitation is going to get to it. Even if we did increase our storage capabilities with changes to precipitation patterns, the problem is that it (water from snow) may not get to the areas where we really need it."

OTHER BENEFITS OF SNOWPACK

In addition to supplying freshwater for drinking and agricultural uses, snowpack also has value in leveling out the amount of water flowing through streams. According to Hill, by holding back water and releasing it slowly throughout the spring is, from an ecological point of view, good for mitigating the peaks of stream flow and regulating stream temperatures (keeping them cooler), which is beneficial to many different species that need cooler waters (such as trout) to thrive.

Snowpack also plays a crucial role in reducing wildfire risk, too.

"On the West Coast, we're pretty well versed in the ways of fire and catastrophes caused by dry conditions," said Schwartz.



“When we have snowpack that sticks around as it has this year well into July or August, that extra moisture helps with forest health and reduces the risk for catastrophic fires. In turn, that helps people who live in mountain communities with their insurance risks.”

In an [article](#) published on January 24, 2023 by the BBC news service by Isabelle Gerretsen, the potential of wildfires is just as worrisome as a shorter winters. Auden Schendler, senior vice president of sustainability at Aspen Skiing Company, which operates the Aspen Snowmass resort in Colorado, is quoted in the article as saying, "In the United States, wildfires are almost a greater threat. We're already seeing fires at ski resorts. They're as big a threat as loss of snow." Schendler added that in recent years the resort has also experienced mudslides caused by extreme rainfall.

NO SNOW FUTURE

Numerous experts foresee a future where some of the world's best-know ski destinations throughout the world may experience a snow-less future. This future may not happen for 60 or 70 years from now, but the writing is on the wall. According to a [2018 study](#), the ski season shrank by an average of 34 days between 1982 and 2016. Ski resorts located at lower elevations suffered the most.

In the Western U.S., that low to no snow future – a transition in precipitation from snow to rain -- may come even sooner, according to Hill. Possibly as soon as 2050 or 2060, if climate change isn't somehow slowed down.

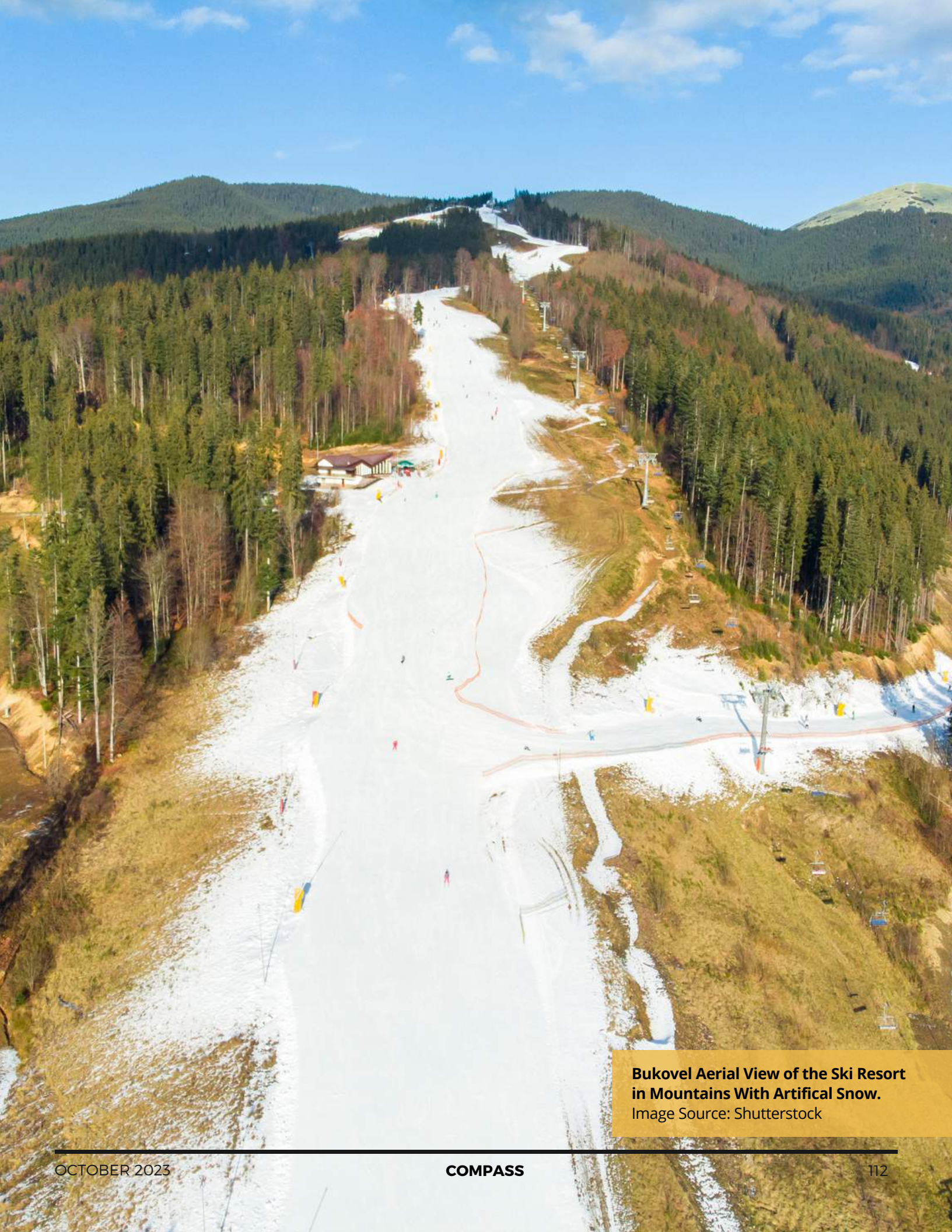
“Realistically, we’re looking at a two-to-four decade period throughout the Western U.S. in which we really start to see a lot of decline in the snowpack and potentially years with no snowpack,” said Schwartz. “This isn’t just a problem in the U.S. It’s a global issue. For example, in Australia, the [Snowy Mountains](#) contribute substantial amounts of water to their agriculture. In the [Murray-Darling Basin](#), 60% of the water comes from the Snowy Mountains. They’re expected to see a 60% decline by 2070 as well.”

“It’s scary to think about,” he added. “We’re not talking centuries, maybe just two to four decades.”

RISING TEMPERATURES, EXTREME WEATHER EVENTS

What’s driving Hill and Schwartz to worry about the future of snow is the continuous rise in global warming, which is resulting in more frequent and more intense weather. It’s this variability that’s most concerning. Rather than more days with a relatively modest amount of snowfall, some areas, such as Sierra-Nevada Mountains surrounding Lake Tahoe, might receive mega snowfalls, like what happened in December 2021 when 18 feet of snow fell. When a water system is built on averages, rather than a range of extremes, that can be a problem.

However, what many people may not realize is that as our atmosphere becomes warmer, the air is able to hold more water vapor.



**Bukovel Aerial View of the Ski Resort
in Mountains With Artificial Snow.**
Image Source: Shutterstock

“For every one degree Celsius that the atmosphere warms, it can hold about 7% more water vapor,” said Schwartz. “So, if you’re in the path of that storm that’s going to hit, you’re going to get more moisture, and if you’re outside it, you’re probably going to be quite dry. That means there’s a potential for larger snowfall events, as well as larger flooding events.”

Related to this is the fact that whether precipitation comes down in the form of rain or snow, warmer temperatures mean that more water is evaporating into the air, which can mean less moisture downstream. In other words, warm, sunny days turn snow into vapor, robbing the future use of that snow as liquid water soaking into the ground or going into streams and running into reservoirs. Brad Udall, a professor at Colorado State University who leads the Colorado Water Institute and has extensively studied the Colorado River has a more serious warning: The Colorado River is going through a process of [aridification](#).

What does this all mean for places that rely on snow?

As snowpack becomes more variable, Hill says that places that rely on snow, such as ski resorts, should consider diversifying their businesses and looking to attract visitors year-round. While some winters could produce mega amounts of snowfall, the potential for less than average amounts will continue to increase over time. Instead, ski resorts may want to consider promoting year-round and summer activities, such as mountain biking, hiking, and other outdoor activities that don't require snow.



Aireal view of the dried river courses
Image Source: Shutterstock

IF YOU LOVE SNOW, YOU NEED TO TAKE ACTION

But what if you love your snow and skiing so much that you don't want to settle for winters without snow. What can one do?

Both scientists say that we all must start to learn more about our water resources in our area, and if where you live depends upon snow, learning more about how snow impacts the water resources in your area.

"It's time for us to have a long, hard thought about our water, where it comes from and how we use it," said Schwartz. "We've reached a critical moment. We need to think about whether our water will be there or not. We need to have a discussion about the number of people who can live in some of these arid locations. If we had not gotten the winter that we just had (in the American West, with record snowfalls), we would have seen entire towns going dry without water."

"I think there are things we can do in our daily lives to limit our water usage, especially during a drought," added Schwartz. "But, that being said, the larger thing is getting organized and getting involved in local decision making with your local municipalities and local representatives. Collectively, when we start moving policy through that affects larger quantities of water, we're going to be far more impactful than doing less laundry on a daily basis. It's about getting more organization, more involved with policy and working within the system to make change happen."



Stephen Dupont

Stephen Dupont serves as the editor of Compass magazine. To reach him with a comment about this article or Compass magazine, visit his LinkedIn page at <https://www.linkedin/in/stephendupont>.

A person is seen from the side, looking through a large telescope. The background is a blurred cityscape with buildings and greenery, suggesting a high vantage point. The text "WORLD OF FORESIGHT" is overlaid in large, white, bold letters.

WORLD OF FORESIGHT



IN FOR THE LONG HAUL: HOW TO HELP GOVERNMENT ACT MORE LONG-TERM

By Laurie Smith

Image source: Canva

In its bid to form the next government, the UK's left-of-center Labour Party recently unveiled one of its top missions: [to create a National Health Service fit for the future](#). Central to their thinking is the importance of prevention rather than cure. The Economist magazine agrees. In [a recent editorial](#), it argued that Britain's health system needs to focus more on prevention. One imagines that the late banker Sir Derek Wanless would concur. His [government commissioned a report on public health](#) that also stressed the importance of prevention. It was published in 2004.

If prevention is so important to health and has been foregrounded so many times throughout recent history, why don't we see more of it? Much of the problem lies in a system of policymaking that discourages future thinking.

A REACTIVE STATE

Short-termism in government is not restricted to health or to the UK. Many wealthy countries don't build enough homes or invest enough in infrastructure, and live in ways that saddle the next generation with enormous debts and a depleted planet.

Part of the problem is that policymakers are often hostage to systems that make long-termism hard. As the UK [Institute of Government has described](#), responsibility for long-term challenges is often spread across departments, their costs and benefits are dislocated in time, and these issues are intellectually and politically contested. Too frequently the excellent insights from horizon scanning teams such as the [UK Government Office for Science](#)

are lost in the midst of the next crisis. It's not surprising that we're so myopic.

MINISTER FOR THE FUTURE?

Countless reports and committees have called for the UK government to think more long-term but how is that meant to happen in practice when so many of their incentives push in the other direction? Instead of well-meaning hand waving about the need for long-termism we need to alter the structure of policymaking so that more anticipatory thinking and action is baked in from the start.

Already governments around the world have been experimenting with how this might be done. A few are briefly described in Nesta's report [Minister for the Future](#) that was published in Prospect magazine. To start a more fulsome conversation about how to make the government more future facing in practice, a number of these policies are outlined below in five loose categories.

1. ENFRANCHISING THE NEXT GENERATION

Perhaps the most democratic way of encouraging future thinking is handing more power to those who will have to live with the consequences of today's decisions. Eminent political scientist [Professor David Runcimen](#) has proposed [votes for six year olds](#). On the face of it this idea seems outlandish. But digging deeper it's harder to be so sure. For example, one objection is that children might simply vote in the way their parents tell them. Yet a similar argument was made about women being influenced by their husbands in the early twentieth century.

Another way of enfranchising the next generation highlighted by President of Columbia University Baroness Minouche Shafik is [weighing votes by age](#). A less contentious means of doing something similar includes Tunisia's [quotas to ensure younger people were better represented in their Parliament](#) and [Germany's "youth check"](#) of proposed policies. Although not intended as such [mandatory voting like in Australia](#) could increase youth engagement

2. REPRESENTING THE FUTURE

Trickier than handing power to younger people is representing future generations who haven't even been born yet. In Japan, for example, [Professor Tatsuyoshi Saijo has undertaken research](#) on whether people can be encouraged to take the needs of their distant descendants as seriously as their own. He found that nominating some of the people involved in decision-making to negotiate on behalf of future generations led to better outcomes for those groups. Cities and towns across Japan such as Uji, Kyoto and Matsumoto have since adopted this model.

A more straightforward approach is scrutiny of current policy with an eye to future generations. Political theorist [Professor Simon Caney](#) has proposed a [Select Committee for the Future](#) to help achieve this goal. Another mechanism is Future Generations Impact Assessment where policies are tested for their intergenerational consequences. The School of International Futures has [recently developed such a framework](#) which has been adopted by the Portuguese President.



Image source: Canva



3. FOLLOW THE MONEY

Giving financial power away can be an effective way of encouraging future thinking. In 1997 the UK government handed over control of interest rates to a newly independent Bank of England. Part of the reason was to stop politicians from creating temporary economic booms prior to elections which would increase the chances of their return to power at the expense of the long-term health of the economy.

A number of countries such as [Norway](#), the [United Arab Emirates](#) and [Kuwait](#) have sovereign wealth funds with long-term goals. These state-owned investment vehicles are often created to manage revenues from natural resources such as oil and gas. They can help embed long-termism into the use of these financial resources by smoothing out revenue over time and sharing windfall benefits across generations. Ironically, oil and gas contribute to the long-term problem of climate change.

What gets measured is often what gets done, so financial metrics can be a powerful way of encouraging future thinking. In his 2006 [review of the economics of climate change](#) for the UK government economist Lord Nicholas Stern called for new ways to think about the future benefits of current investment (discounting) for issues that might alter the fundamentals of how we live. More recently the New Zealand government unveiled a new system of [Wellbeing Budgets](#), which seek to take better account of long-term challenges such as housing, domestic violence and child poverty.

Image source: Canva

4. FLEXIBILITY AND LOCK IN

Sunset clauses where policies are reviewed after a certain length of time can give governments the freedom to act in a more long-term manner. Although subject to political mischief of late, the [US debt ceiling](#), which requires Congress to review the nation's borrowing above a certain limit, is one example.

Another way of building flexibility into future policymaking that has been gaining interest of late is [anticipatory regulation](#). Technological and social change can be so rapid that existing regulatory mechanisms struggle to cope. Anticipatory approaches to regulation such as the [Financial Conduct Authorities Regulatory Sandbox](#) seek to make these policies more adaptable to future change.

At the other end of the spectrum are measures that lock in long-term goals. One example are targets such as the [Millennium Development Goals](#). In practice, legally protected rights and freedoms have also sometimes proved a powerful way of locking in more long-term thinking. The [German Constitutional Court ruled in 2021](#) that plans by the nation's government to tackle climate change delayed action too long, imposing on the freedom of future generations.

5. FUTURE-FOCUSED INSTITUTIONS

One tool for embedding long-term thinking in policy are institutions that are explicitly given this responsibility. Governments in Singapore, the UK, Canada, the USA and elsewhere have teams responsible for foresight.



More traditional strategy and planning teams such as the [French Haut-Commissariat au Plan](#) also frequently spend some of their time considering the future.

Taking the idea of future focused institutions further the United Arab Emirates has established a whole virtual [Ministry of Possibilities](#) which includes "building future government systems" as part of its remit. And countries such as [Wales](#) and [Sweden](#) have appointed roles that might be described as "Ministers for the Future."

UNINTENDED CONSEQUENCES

Policies to encourage longer-term thinking do entail some downsides.

For example, independent central banks take power from elected representatives, which could be seen as undermining democracy. Yet democracies have long included unelected checks and balances such as independent judiciaries so instruments to encourage long-termism might be seen in the same light. Additionally, many of the policies that seek to represent the next and future generations actually increase democracy by giving more people a say.

Stagnation is another potential unintended consequence of certain long-term policies. When the future is uncertain the pressing concerns of one period might not be so relevant in the next. To some extent this sort of rigidity might be tackled through periodical review in a manner similar to work of the [UK Climate Change Committee](#) on that country's climate targets. Foresight methods are explicitly intended to explore uncertainty and some long-termist policies such as anticipatory regulation can actually make decision-making more flexible.



Laurie Smith

NOW FOR THE LONG TERM

Governments in many Western nations increasingly feel they are lurching from crisis to crisis. From runaway inflation to Covid, policymakers seem focused more on symptoms rather than causes. Our current model seems almost designed to kick the can down the road.

Yet we have seen that across the globe there are examples of policies that weave long-term thinking into the very fabric of government. This isn't just about tackling isolated future problems (although we need to do that too). It's about reshaping our whole way of policymaking. To go beyond a well-meaning intent to think more long-term, we need to identify and understand practical policies that will actually make our system of government think and act long-term.

[Laurie Smith](#) leads strategic foresight research for [Nesta](#). He oversees much of the organization's research into emerging trends, novel technologies and promising interventions. Prior to joining Nesta he worked at the Royal Society, the UK's national academy of science, where he most recently led on emerging technologies and futures, and before that, he managed a team focused on science and innovation policy.

Previously he worked at the Academy of Medical Sciences on policy around medical science, public health and international health. During that time, he undertook secondments at the Department for International Development and the Parliamentary Office of Science and Technology.

NORMALIZING POLYCRISIS

by Chris Jones



Image source: Canva

The latest buzzword, flamed by the extreme summer heat, is *polycrisis* -- although most of the crises that the neologism encompasses were either already well underway or percolating in the background.

“Welcome to postnormal times” (PNT), as articulated by [Zia Sardar](#) in 2010, was a warning that polycrisis is not new, but “more of the same” and now on steroids. Are we creeping with constant disruptive change, ever closer to postnormal burst? For many people and clients, it seems like life is in constant turmoil.

Consider emerging artificial intelligence (AI) technology, which has dominated the conversation in foresight and futures studies conferences, listserv discussions, and now policy conversations. The United Nations is establishing a high-level council to consider AI regulation and oversight. While narrow AI has already proved popular and useful, concerns grow about artificial general intelligence (AGI) and the potential emergence of artificial super intelligence (ASI) that could be dangerous or hard to control. There seems to be little doubt that the AI frenzy is currently driven by the success of applications of large language models and transformer technology in Chat GPT (written language) and DreamStudio (images). But there has also been extensive media coverage of doomsaying and hand wringing about AI. Leading developers and scientists working in the area have famously warned about the existential threat that AGI and/or ASI may pose.

While we share their concern about the potential unintended consequences of AI, one does have to wonder how much of the

current discourse is hype or is simply postnormal dynamics at the core. Because, in many ways, the use of AI is currently a driver of postnormal change. By focusing on AI, we may lose sight of the postnormality in our systems: science and technology systems, the world capitalist system, energy and transportation, and socio-cultural systems.

Postnormal dynamics are increasingly hard to ignore -- one similar response has been the emergence of VUCA (volatility, uncertainty, complexity, and ambiguity) analysis in business management, and *disruption studies* emerging in strategic foresight. VUCA is *PNT lite* — PNT analysis is a robust, layered approach to these disruptive dynamics that allows for more systematic analysis. ASI, for example, should be understood in terms of the roles it will play in modifying our manufactured normalcy fields (MNFs--more below).

Sardar laid out the essentials of postnormal theory a dozen years ago, developed it further (the Three Tomorrows) with [John Sweeney](#) in 2016, and then produced a *Postnormal Times Reader* (2017) as well as other essays devoted to PNT. In the meantime, dozens of articles have been written, both supportive and critical of the work.

Sardar, Jordi Serra, and Scott Jordan produced *Muslim Societies in Postnormal Times: Foresight for Trends, Emerging Issues and Scenarios* (2019), Sardar edited *Emerging Epistemologies: The Changing Fabric of Knowledge in Postnormal Times* (2022), and a second *PNT Reader* is in production. Maya van Leemput, Linda Hyökki, and Christopher Jones edited a special issue of *World Futures Review* (June 2021) on *Postnormal Matters*.

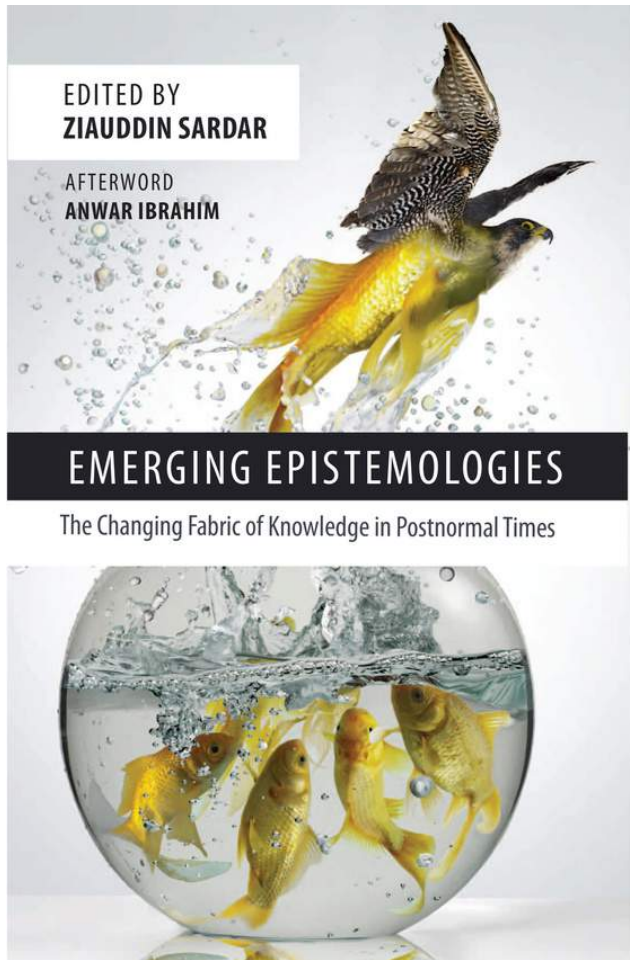


Image Source: Amazon.com

The postnormaltim.es website contains many videos and podcasts featuring international presentations by PNT network colleagues and links to Peter Hayward's *FuturePod* presentations by fellows and staff of the Centre for Postnormal Policy and Futures Studies.

Sardar and network members have held PNT and futures literacy workshops/polylogues in Sarajevo, Kuala Lumpur, Istanbul, Barcelona, Helsinki, Alexandria, London, and the USA. We have also facilitated our Postnormal City Water Use Game in Phoenix at Anticipation 2022 and at the Turku, Finland Empowering Futures conference in June 2023.

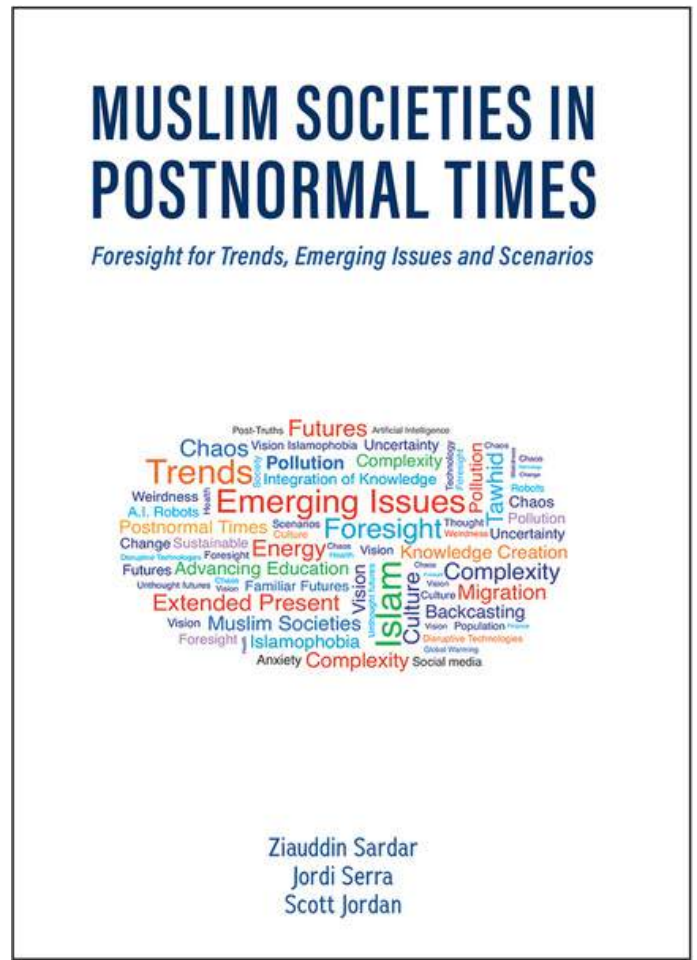


Image Source: Amazon.com

Other significant contributions include the *Atlas of Muslim Futures*, the *SCRIPT* for Malaysian policy, and the *SAFER* education workshops and report for the Sarajevo Canton of Bosnia and Herzegovina.

TOPOGRAPHY

The basic idea of PNT analysis is to better account for the acceleration of change across systems, the four S's: **speed, scope, scale, and simultaneity**. The pace of change quickens, particularly in climate change and technology innovation. Thanks to globalization (internet, supply chains, jet travel), changes are increasingly global in scope and scale, and they are happening as in the movie *Everything Everywhere All At Once*.

These accelerants parallel the three C's: growing **complexity**, **chaos**, and **contradiction**. The four S's and 3 C's feed each other through positive and negative feedback loops. Social and technological systems become ever more complex and bureaucratic to cope and navigate growth and interdependent systems across the planet. The COVID pandemic clearly showed how entrained global systems rely on supply chains, cooperation, and coordination to function effectively. Yet rapid change creates disruption that characterizes PNT, because of smartphones, social media, and AI-caused turbulence. Chaos and contradictions abound.

Also essential to PNT analysis is an understanding of increasing **ignorance** and **uncertainty**. Sardar and Sweeney pointed out that growing ignorance and uncertainty are both deep and shallow -- that there is ignorance of facts, for example, but also ignorance of what we

don't know. It is also critical, they argued, to consider exploration of the unknown unknowns. Similarly, shallow uncertainty can cloud short term decision-making, but deep uncertainty generates doubt and indecision -- when we can least avoid it as a planetary species.

MENAGERIES AND MANUFACTURED NORMALCY FIELDS (MNFS)

To better understand the topography of PNT, we have refined some of the early concepts identified to make sense of postnormal times. The menagerie: **black swans**, **black jellyfish**, and **black elephants** have been used to describe PNT phenomenon -- not intrinsically or necessarily either positive or negative -- surprises and disruptions due to human activity and unintended secondary or tertiary consequences of technology or social developments were inspired by [Venkatesh Rao](#) (2012) to describe the worldviews, social constructs, or perceptions

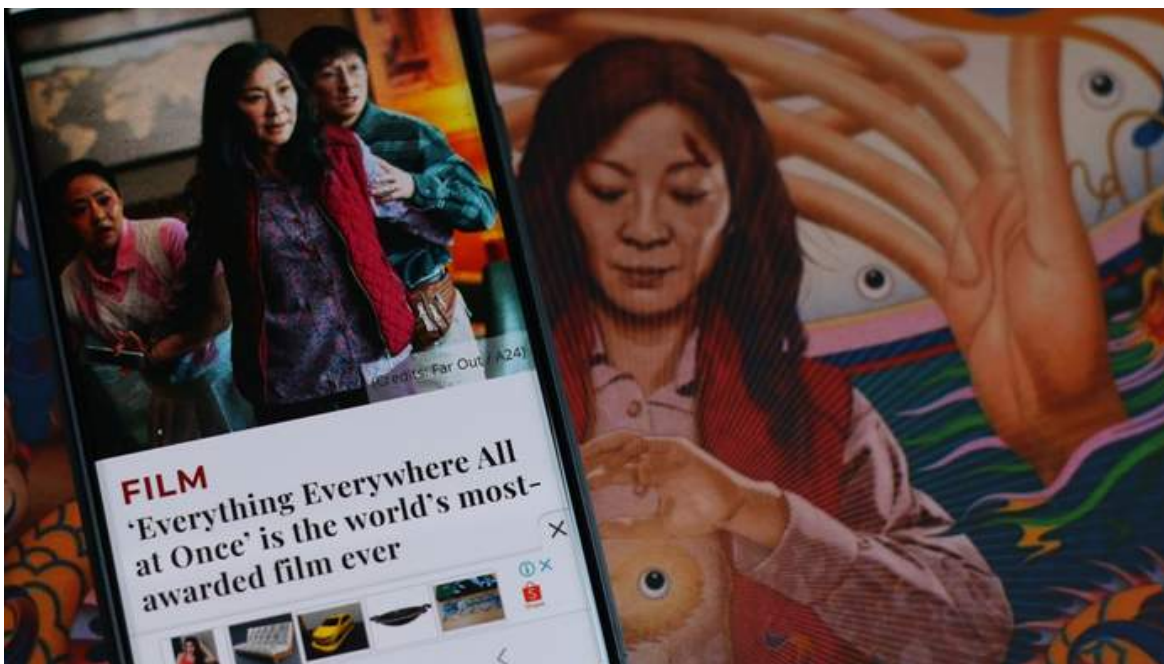


Image Source: Shutterstock



Image source: Canva

that constitute “reality.” MNFs, in Rao’s terms, prevent us from seeing that the future is already here, from seeing that the past, present, and future are not integrated—they are not stitched together well. We have taken this further to suggest that MNFs are cognitive structures, they include psychological and perceptual biases. Further, they are reified by culture. MNFs are structural and systems phenomena as well, that continue to drive the illusion of normalcy. This is very much the case for the post COVID years where culture and business try to recapture the previous normal — despite the evidence that many people and communities did not find “normal” all that wonderful.

PNT analysis describes the topography of emergent fields, where:

- Burst is the accumulation of the acceleration of change across all systems and the end of shared meaning;
- Creep is the building weirdness and chaos that precedes PN burst;
- Postnormal lag is the inability to adjust to sweeping changes -- the slow acceptance of the changing environment; and,
- Tilt is temporary awareness and accommodation of disruptive change, like the city bus that lowers to a curb.

We have recently engaged in discussions and polylogue regarding the epistemological, ontological, and axiological (values) aspects of burst, lag, tilt, and creep. We wonder whether better futures literacy and futures fluency might

have on the magnitude of creep and burst, perhaps to mitigate the surprise when things get weird? The menagerie has been a good source of examples of postnormal phenomena. Was the pandemic an elephant in the room (zoonotic diseases) or a black swan (clearly not for public health professionals)?

While almost everything about postnormal analysis is very much about the present, the Three Tomorrow’s approach to scenario planning is very much about projecting postnormal conditions into the future. Sardar’s work has gone even further by positing a transnormal future -- a civilization or society that no longer is characterized by dramatic and disruptive change, but rather a new paradigm, or a global worldview. The Three Tomorrows are futures that are bounded by growing uncertainty and ignorance if you imagine them as a futures cone. Unlike the linear nature of the classic futures cone, both uncertainty and ignorance are more nuanced: with uncertainty at the *surface, shallow*, and deep, and ignorance: *plain, vincible, or invincible*. The more postnormal things get, the deeper the uncertainty and the less vincible our collective ignorance will be.

In contrast to the linearity of the Three Horizons model, the positioning of Three Tomorrows futures/scenarios is more dependent on the maturity of postnormal burst(s) than chronology. In the Three Tomorrows approach to planning for scenario building, the **Extended Present** considers what most people mean when they talk about “the future.” It is the worldview built on the trends that swirl around us. It is the Continued Growth future in Dator’s terms.

The next set of futures are **Familiar Futures** such as the high-tech images from science fiction and popular media, counter-culture feminist, green, and conserver society images — what [Sohail Inayatullah](#) calls “used futures.” Beyond Familiar Futures, perhaps in time, but even further downstream in postnormality are **Unthought Futures**.

These futures/scenarios are not necessarily unthinkable, but rather unthought. [Jordi Serra](#) noted that the value of considering unthought futures is that they force us to consider why we think about the future in particular ways. “Why [is it that] some futures are always at the front and others never get a shot?”



Christopher B. Jones

Christopher B. Jones, Ph.D., is Senior Fellow, the Centre for Postnormal Policy and Futures Studies; Faculty, DMS International Futures Academy; and Fellow, World Futures Studies Federation (Secretary-General 2001-2005). A graduate of the University of Hawaii alternative futures program (MA, PhD), he taught at the University of Houston MSc in Studies of the Future program and in the Hawaii, Oregon, and Colorado state systems of higher education.



PSYCHOLOGICAL CHALLENGES OF FUTURES THINKING

By Graham Norris

Image source: Canva

At a recent conference on business psychology, I was speaking to someone about futures thinking and decision making. This person was initially curious, but as is often the case, their eyes soon glazed over as the thought of the future overwhelmed them.

I wish I'd shut up at the curiosity stage.

The work of futurists often involves holding the hands of people as they explore the unknown, and as they grapple with complex emotions of wonder, hope and fear. The tools of foresight recognize that it is neither easy nor natural for most people to think into the long-term future, yet they only rarely tackle head-on the psychological challenges participants face.

Humans are no strangers to thinking about the future. In fact, by some estimates, thinking about the future is pretty much all a healthy mind does. Yet it is very much about the immediate future – what to wear, what to say next, what to have for lunch. Occasionally we may think about tomorrow, perhaps next week and, if we really put our minds to it, a holiday next year.

The immediate term is where our brains are most comfortable, because it is in this timeframe that they can more comfortably make predictions, which may be a dirty word to foresight practitioners but nevertheless reflects the reality of how we think.

For the long-term future, credible prediction becomes impossible, and therefore for many people stress-invoking. I describe this as our psychological allergy to uncertainty, which can present itself as one or more of the following symptoms.

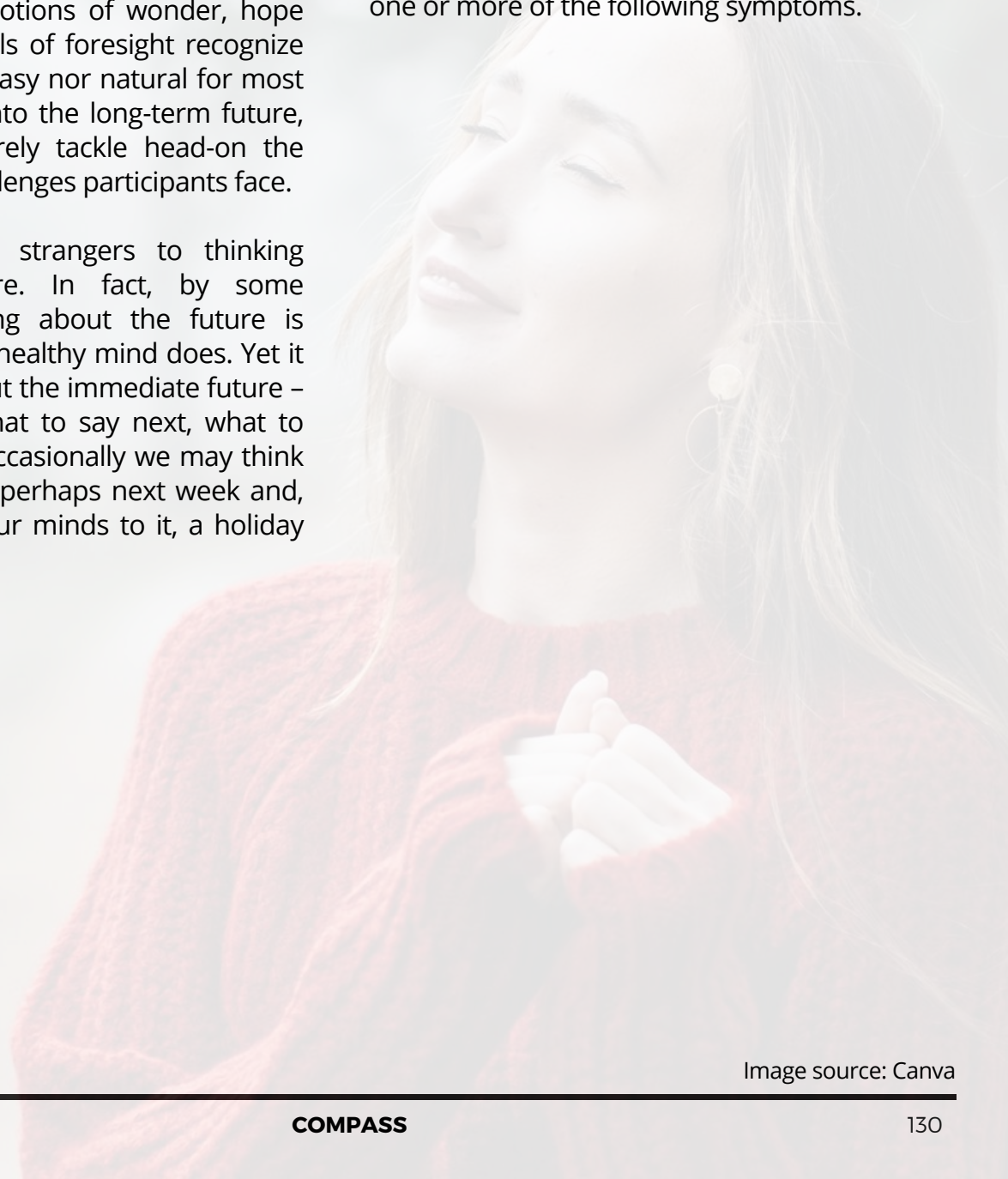


Image source: Canva

Some psychologists see the brain's primary mission not as thinking, but rather as budgeting. To survive, our bodies need to constantly monitor hydration, nutrition, temperature, and other conditions, and we are subconsciously on alert for signs that any particular factor may be moving beyond its tolerance. This is called allostasis and it incorporates a wide range of physiological systems to maintain healthy balances in one's body. But the brain needs to do this efficiently, hence the benefit of predicting, rather than responding to, the world around it.

We are therefore used to predicting and basing our actions on those predictions. Even in the short-term, a breakdown in this process can be troubling. Say you go to your kitchen to make a coffee and discover the coffee machine isn't working. What's wrong with it? How can I find out? How long should I spend diagnosing the problem? Will it be expensive to fix? Is there a risk of a fire? Have I paid the bill? The discovery of the unresponsive coffee machine has created uncertainty, and the brain floods with questions and potential answers. These answers coalesce into potential strategies for handling this novel situation. If one of these strategies stands out as resolving the uncertainty, the brain will focus its attentions on execution. If not, then the situation is treated as a threat, invoking the stress response. It is the uncertainty of the situation, or rather, our uncertainty with how to respond to it, which creates the stress.

PSYCHOLOGICAL ALLERGY TO UNCERTAINTY

And that's just for short-term uncertainty.



Image source: Canva

For the long-term future, credible prediction becomes impossible, and therefore for many people stress-invoking. I describe this as our psychological allergy to uncertainty, which can present itself as one or more of the following symptoms.

One is to try to relieve the discomfort of uncertainty by searching for information that can resolve it. For most of human history, this approach was feasible because there was very little information to discover. Simply observing whatever was around and asking others would quickly exhaust all avenues of enquiry. But we now have access to so much information that we quickly become

exhausted by our search efforts. The paradox of information is that the more of it we have, the more uncertainty it creates, because it gives us more options and more decisions to make about the information-gathering process itself.

Second is the tendency to excessively hedge. Research shows that we much prefer to have the option to reverse our decisions, so we can remake the future if things seem to be turning out differently to our expectations. We look for insurance, compromises, and decisions by committee. Yet the same research shows that having the option to reverse makes the decision less satisfying.

The third, and most pernicious, symptom of our psychological allergy to uncertainty is not making any decision at all. Passively sticking with the status quo so that we don't have to deal with assessing all the other possibilities leads to paralysis in the face of change.

TAKING THE STING OUT OF UNCERTAINTY

What can be done, therefore, to relieve this inflammation of the mind and reduce the intimidation people feel when they confront the future? Here are four ways futurists can help participants lean into the future.

1. Create Space to Think

To access more appealing futures, people need to escape the noisy present. This means ensuring they have time to acclimatize to different patterns of thinking, can decompress when they need to return to the present, and are offered frameworks to help make futures thinking a more natural, everyday activity.

2. Set Realistic Expectations.

The future can be overwhelming because its infinite possibilities seem beyond our very limited, working memories that we can employ to consider them. It's important therefore to offer reassurance from the outset that the goal isn't to understand everything about the future, but rather to increase awareness about a particular slice of it. This means letting go of the short-term need to predict and become satisfied with making rough estimates.



Image source: Canva

3. Generate Hope and Optimism

Hope is the expectation that things out of your control will be okay, and optimism is the expectation that what you do will turn out okay. They are both important because they give energy to people's decision making. Conversely, the lack of hope and optimism are the hallmarks of mental illnesses such as depression and anxiety.

4. Cultivate a Spirit of Experimentation

Dealing with uncertainty means accepting that whatever you do has a range of possible outcomes, so everything is really just an experiment. It's important, therefore, to see feedback loops as a central part of futures thinking.

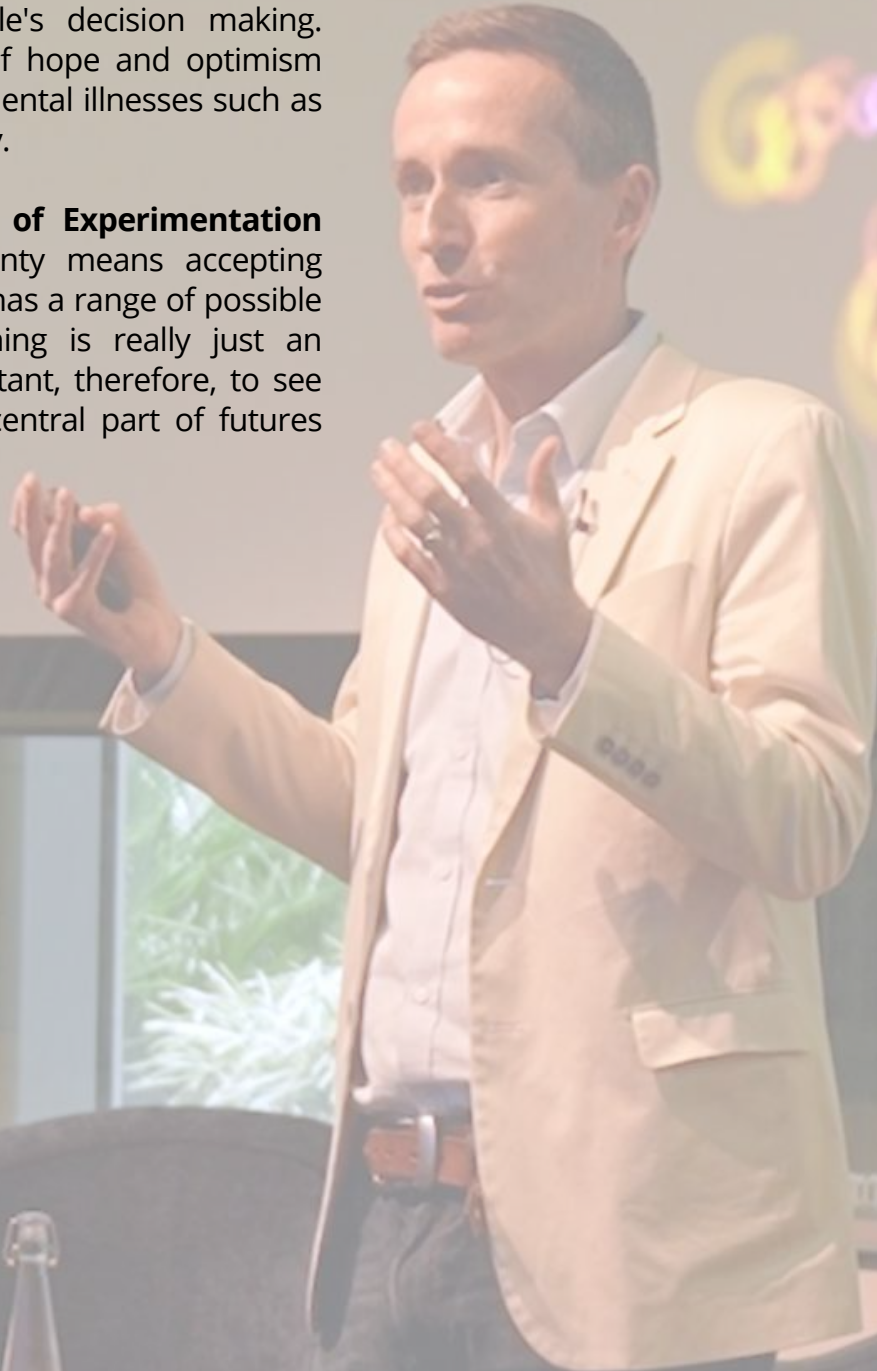


Image source: Canva

There may be other ways to address the psychological challenges of uncertainty. And the question remains how to apply them. Should new tools be developed? Should existing tools incorporate some of the ideas presented above? Or should those ideas be shaped into a framework into which the tools of foresight are incorporated?

Everyone has a different perspective on the future, and a different immune response to uncertainty. Yet we all have some propensities that should be recognized in the cognitively challenging task of exploring the future and making decisions about it.



Graham Norris

Graham Norris is an organizational psychologist focusing on foresight and futures thinking. He spent 20 years living in Asia, including a decade as a journalist in Taiwan, Singapore and Japan. More recently, he worked in marketing consulting and communications in Beijing, China, before moving back to the UK. He holds an MBA from Heriot-Watt University and studied the impact of rapid change on Chinese knowledge workers for his doctoral research. He now runs Foresight Psychology, helping people stretch their imaginations to design more innovative futures. To learn more about Graham and his foresight psychology practice, visit www.foresight-psychology.com.

PROFILE: JOANNA LEPORE ON FORESIGHT AT MCDONALD'S

By Stephen Dupont



Each day, more than 69 million people head to one of 40,275 McDonald's restaurants located in more than 100 countries across the globe for a Sausage Egg McMuffin, a Big Mac, or those incredibly delicious McDonald's French Fries. That's more than 25 billion customer visits per year.

With that type of reach and influence, it's no wonder that McDonald's decided to create a dedicated team of foresight professionals to help its business leaders and franchise owners anticipate potential opportunities ahead, reduce risks to potential disruptions, and build a more sustainable, equitable and inclusive business model that better meets the needs of its customers.

To lead its foresight team, the company recruited Joanna "Jo" Lepore, a professional futurist who previously helped build a foresight practice at Mars Wrigley, a division of Mars, Inc., an American multinational manufacturer of confectionery, pet food, and other food products and a provider of animal care services - with household brands such as M&Ms, Snickers, Twix, Dove, and Wrigley's.

Born in Poland, Lepore's parents moved their young family to Australia to begin a new life in the early 1990s. It's there that Lepore had her first McDonald's cheeseburger as a young girl, inspiring a fond memory of her father, who passed a few years later.

After college, Lepore entered the world of marketing. "I absolutely loved it. I did every type of marketing under the sun - communications, advertising, product development, white space innovation,

media planning." After 10 years, she was ready for a change and moved into consumer insights to "get closer to the unmet opportunities that we could be tapping from a business perspective."

"I've always been really passionate about business transformation," Lepore said, "and I just naturally started to do foresight work."



Her work in foresight and consumer insights in Australia, caught the eye of her leaders in the U.S., and Lepore was offered the opportunity to expand the scope of the foresight practice globally for Mars Wrigley, while working from the company's New Jersey headquarters. After working for Mars for 4.5 years, Lepore moved to McDonald's in Chicago, to accelerate the implementation of the foresight practice, which had just been formed.

FORESIGHT AT MCDONALD'S

Lepore explains that the McDonald's foresight team, which includes four professionals at this time, is focused on helping the company's businesses think beyond its current planning cycle, envisioning the next 10 years, and even further, based on the issue. The team looks two to three decades out to evaluate the macro forces of change that will affect the entire McDonald's global system. The team also takes deep dives into specific topics.

"We use foundational foresight work to help align our systems on the big things that we should be focusing on," Lepore said.

To Lepore, it's not a surprise that McDonald's would be open to a dedicated foresight function. Many consumer-packaged goods and fast-moving consumer goods companies are creating dedicated foresight teams as they've watched changes in the marketplace, as well as significant disruptions, affect consumer behavior.

"Multinational companies that have been around for a long time are seeing

disruption from smaller start-ups. They're recognizing that foresight can give clarity around consumer behaviors," said Lepore. "I think many of these companies had bits and pieces of foresight and futures thinking already in place, they just didn't know it. For example, when I was doing marketing, I was already pulling in futures thinking and developing different scenarios."

As a dedicated function, the foresight team at McDonald's leverages professional foresight methods and tools to go directly to the company's leaderships teams and provide guidance on preparing for the future.

"McDonald's has been around for 68 years," said Lepore. "It's a very sophisticated business. When people think of our company, they think of it as a very systematically structured organization. It's automatically geared towards growth and success and being able to live through many hurdles and disruptions in the external environment - much better than a lot of other organizations. The company has a culture of experimentation where it has tried to expand into new areas (breakfast menu, all-day breakfast) or explore different consumer products (McNuggets, McRib, Oreo Affogato, Shaka Chiki, Chicken Maharaja Burger, and Coconut Sticky Rice Pie)."

ADVOCATE FOR FORESIGHT

In many large corporations that have or are in the process of establishing an internal foresight team, an advocate or champion is needed to make the case to upper management that investing in foresight will have a positive impact on the business.



Challenges to
diversity
and inclusion

Polarization and friction
make it harder to navigate
key issues around identity
and inclusion.

With today's
workforce
people have
different
expectations

Identity
and
Inclusion



In the case of Lepore and her team, [Michelle Gansle, Vice President of Global Insights & Analytics McDonald's](#), is that person. Prior to joining McDonald's, Gansle led the consumer insights function at Mars, Inc., where she encouraged Lepore to expand her foresight practice.

"Michelle tapped me on the shoulder and said, 'Come and set this up for Mars,'" said Lepore. "She saw the value and the impact that it could have on the organization. So, she made a case to the leadership team, for McDonald's globally, to create a foresight team and pushed for a three-year commitment."

"Michelle knew, like I've learned myself," continued Lepore, "you can't launch it and off you go. It's a process that requires a lot

of patience, and a lot of hard work. She set the right expectations. And now we're building the credibility in what foresight can do."

ORGANIZATION EMBRACES FORESIGHT

While Lepore has only been at McDonald's a relatively short time, she feels that the organization is embracing foresight and its value to the organization.

This sort of surprised Lepore, who felt that McDonald's "is a bit more traditional and systematic." But right from the start, her team has been feeding the company's strategic planning, innovation territory setting and product development efforts.

To gain further acceptance, Lepore speaks to the importance of "building a culture of

curiosity,” which means doing a lot of workshops and back casting with various teams throughout the company to help them build their imagination muscles, essential for futures thinking.

“It’s not just helping our people imagine what the future could be, but also to help them really think tangibly about how they can create the future,” said Lepore. “Our scope is not limited. That means we work with our global teams, our leadership teams, and with our marketing teams. We’ve done more than 20 sessions with teams and functions around the world. We’ve done workshops in Canada and Germany, for example, where some of our most advanced future forward franchisees were involved, which was an amazing experience for me to see firsthand.”

As Lepore connects with foresight professionals who work with other large corporations, she’s learned that the issues facing McDonald’s are not dissimilar to those facing other companies, whether it’s another company in the packaged consumer food space or a telecom equipment provider. The big difference, however, is how foresight is embraced within an organization and the skill level of employees in using foresight in their day-to-day work.

“So, to compare my roles at McDonald’s and Mars, for example, both foresight teams work similarly, sitting within the consumer insights function,” said Lepore, “Our foresight work is anchored in understanding human beings and the anthropological, sociological, cultural implications of the things we’re seeing in the world. But at McDonald’s, we’re just starting out, and the demand is there for

us to reach all parts of the business. So, we’ve done foresight sessions with our supply chain team, our global impact team, the team handling sustainability and nutrition for our global menu, our restaurant operations and design teams, to name just a few.”

“The impact that we have is defined by us. We have a lot of agency to say, ‘the business is looking like this right now, but foresight can give you a greater advantage of how to approach this topic and how to think about the future of this topic,’” Lepore added. “I’m a firm believer that you need to constantly prove your value – not just in foresight – but in any part of the business that you’re in.”



MEASURING THE ROI OF FORESIGHT

Organizational foresight professionals are often asked how they measure their efforts and justify a corporation's investment in foresight. Unfortunately, compared to other functions within an organization, such as strategic planning, culture building, marketing, etc., foresight seems to get this question more than most. Perhaps, that's because the foresight function is still relatively new to many companies.

For Lepore, the key to measuring the value of foresight is not linked to one simple measure of ROI as some other teams are, such as sales, and that's because there's not one measure that foresight impacts. Can foresight be linked to growth? Yes. Can it be linked to risk reduction? Yes. Can it enhance customer satisfaction? Yes.

Instead, Lepore focuses on what her team is actually delivering, which involves four key initiatives, of which, each has its own metrics of success that the foresight team tracks. These initiatives include:

- Building the company's horizon scanning capabilities.
- Deep dives on specific topics or opportunity or risk.
- Strategic direction through the annual planning process.
- Building a culture of curiosity throughout the organization.

"It's unfortunate that there isn't a simple ROI when it comes to measuring foresight," said Lepore, "But I think more than any other team that I've seen, we task ourselves with being more stringent about tracking the impact we're having."

"I think what's really needed in our foresight profession is a flexibility and adaptability in your mindset," Lepore said. "Whatever the project, whatever team you're working with, whatever market you're working in, you're constantly adapting and trying to meet people where they are, and figure out what tool I'm using, what method I'm using and what kind of relationship do I need to build with that team."



FUTURE OF MCDONALD'S BURGER

Q. So, what's going to be the McDonald's burger of the future? And will the McRib still be around in 2050? Because McRib fans need to know.

Lepore: "Ha! McRib fans! As you can imagine, I get this question a lot. What is the burger of the future? Well, I have to tell you, my favorite is the Big Mac. I guess I'm kind of a classic girl, apparently. Add in some fries, and some Chicken McNuggets – that's my go to. I would go to the mantra of Ray Kroc, who was obviously one tremendously smart businessperson. It's that whatever we're going to be making in the future, we're going to be making more of it than anybody else. We'll continue to listen and pay attention to how the world is changing and what people want and make more of that."



PASSION FOR FORESIGHT

For many professional futurists, the journey to embracing foresight as a career is not always straight forward. And while that's true for Lepore, also, that journey has led her to what she describes as "her dream job," and it's expressing itself in a speculative fiction book that she's writing and the creation of her popular podcast, [Looking Outside](#).

Asked to reflect on what she would tell her 18-year-old self, Lepore said, "I never would have imagined working at McDonald's or living in the U.S. I've tried to remain very open throughout my career to opportunities and moving where the energy is. I feel very fortuitous that I've landed where I am. This is my dream job. And while it is a massive organization and I'm a small part of it, I can make a big impact. That makes me feel incredibly lucky and humbled."

While Lepore studied philosophy and writing in college, she thinks that her passion for foresight began with her strong interest in strategy, which is how she connected with foresight.

"When I was 18 finishing high school in Australia, I thought I wanted to be a novelist. I was very creative and I wanted to change the world. I was very altruistic," said Lepore. "As I reflect on my journey as a person and as a foresight professional, I realize that I still do get to be creative. I get to have a positive impact on the world, and I've figured out how to do it from the inside. I feel incredibly lucky to do it through foresight because I don't think that many people get to do what we do. And when it's done well, it can have such a huge impact."

"I have no idea what the future has in store for me, but I'm going to stay open to opportunities as they present themselves, and not feel like I have to do things in a certain way. I hope my career with McDonald's continues to be in areas such as foresight, which allow me to be credible, impactful, strategic and creative."



Stephen Dupont

Stephen Dupont serves as the editor of Compass magazine. To reach him with a comment about this article or Compass magazine, visit his LinkedIn page at <https://www.linkedin/in/stephendupont>.

THE FUTURE OF YOU: YOUR QUESTIONS ABOUT CAREERS IN FUTURES

By Tracey Follows

Since my first column in the April 2023 issue of Compass, I have been asked to address several questions about careers in futures and foresight. So, in this issue let me take two questions that came to me from a budding futurist who has been attending courses, soaking up the books and reading academic papers for a while.

Q: How can I get initial work experience if I wasn't part of a degree program?

Q: Once I'm competent enough to work professionally, how can I find clients that are interested in either consulting or facilitating foresight workshops?

Very good questions that deserve much longer answers than I can give here but I will offer a flavor of what is possible:

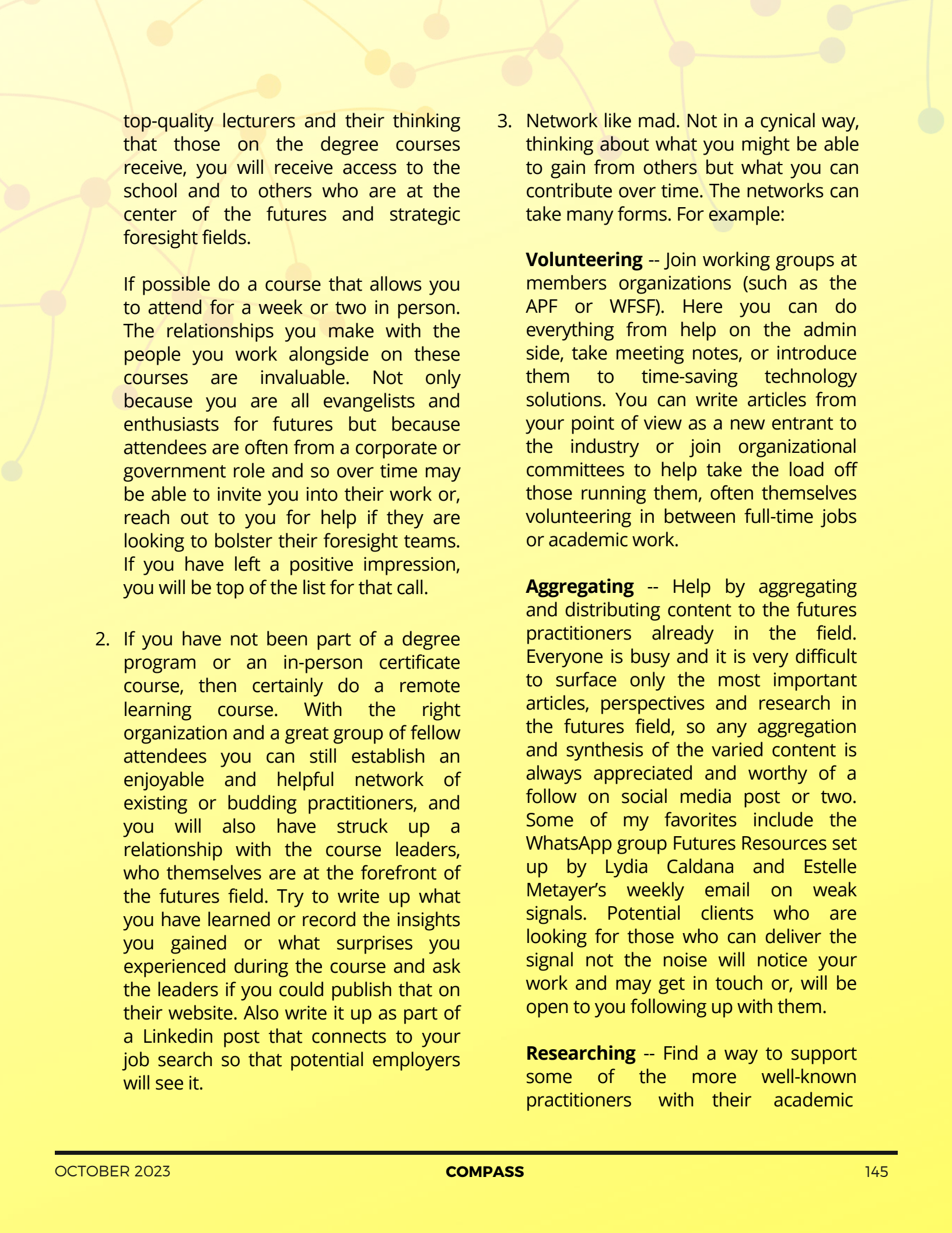
1. **Do as much accredited course learning as possible.** Ideally a graduate or postgraduate degree would stand you in good stead. But that is not always possible for a variety of reasons. In which case, do take an accredited shorter course that is run by some of the institutions that host the degree or post-graduate futures schools. That means not only will you get the

Have a question about your career in foresight and futures studies? Ask Tracey Follows, author of the recent book, [Future of You](#). Send your question to Tracey at tracey@futuremade.group.



Tracey Follows

Tracey Follows is the founder CEO of [Futuremade](#), the futures consultancy, and Visiting Professor in Digital Futures and Identity at Staffordshire University. She is the author of the book, [The Future of You](#), and host of the [podcast](#) of the same name.



top-quality lecturers and their thinking that those on the degree courses receive, you will receive access to the school and to others who are at the center of the futures and strategic foresight fields.

If possible do a course that allows you to attend for a week or two in person. The relationships you make with the people you work alongside on these courses are invaluable. Not only because you are all evangelists and enthusiasts for futures but because attendees are often from a corporate or government role and so over time may be able to invite you into their work or, reach out to you for help if they are looking to bolster their foresight teams. If you have left a positive impression, you will be top of the list for that call.


2. If you have not been part of a degree program or an in-person certificate course, then certainly do a remote learning course. With the right organization and a great group of fellow attendees you can still establish an enjoyable and helpful network of existing or budding practitioners, and you will also have struck up a relationship with the course leaders, who themselves are at the forefront of the futures field. Try to write up what you have learned or record the insights you gained or what surprises you experienced during the course and ask the leaders if you could publish that on their website. Also write it up as part of a LinkedIn post that connects to your job search so that potential employers will see it.

3. Network like mad. Not in a cynical way, thinking about what you might be able to gain from others but what you can contribute over time. The networks can take many forms. For example:

Volunteering -- Join working groups at members organizations (such as the APF or WFSF). Here you can do everything from help on the admin side, take meeting notes, or introduce them to time-saving technology solutions. You can write articles from your point of view as a new entrant to the industry or join organizational committees to help take the load off those running them, often themselves volunteering in between full-time jobs or academic work.

Aggregating -- Help by aggregating and distributing content to the futures practitioners already in the field. Everyone is busy and it is very difficult to surface only the most important articles, perspectives and research in the futures field, so any aggregation and synthesis of the varied content is always appreciated and worthy of a follow on social media post or two. Some of my favorites include the WhatsApp group Futures Resources set up by Lydia Caldana and Estelle Metayer's weekly email on weak signals. Potential clients who are looking for those who can deliver the signal not the noise will notice your work and may get in touch or, will be open to you following up with them.

Researching -- Find a way to support some of the more well-known practitioners with their academic



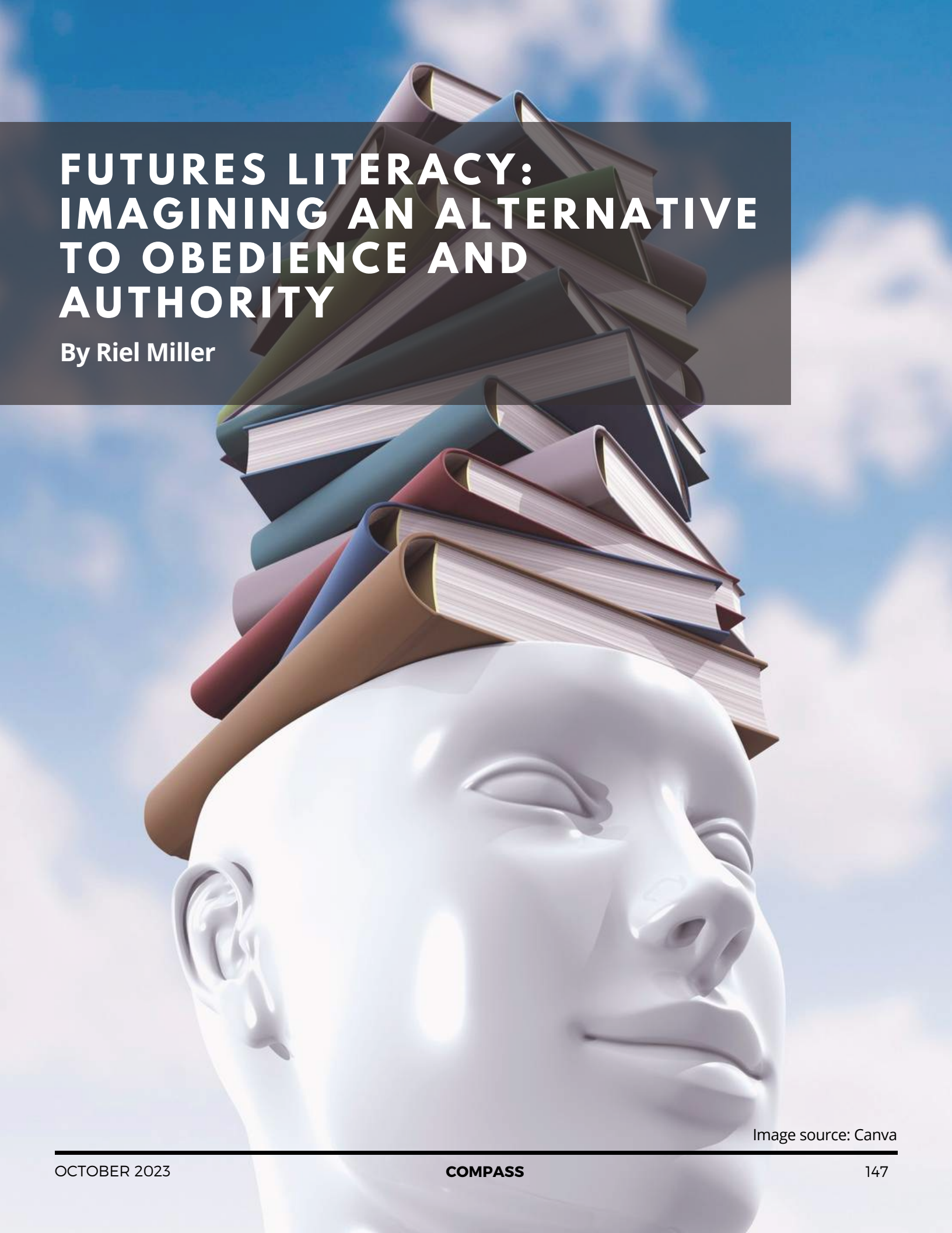
research or think tanks doing commercial report writing. Reach out to them and ask what they are working on and suggest that you have a little time to support them if your interest coincides with theirs. This is not to set yourself up as an unpaid intern. Rather, you are doing this in order to learn the ropes, which will stand you in good stead later on when you are working on client briefs, projects and reports of your own. If you end up working on research that is feeding into a project, ask whether you can be a part of the team that is involved in preparing the facilitation of the workshop, or if you can sit in as part of the team and take notes or do anything that is helpful. Move from helping them with research to helping them with workshops. In time, you may become part of the team. Only do this for as long as you are getting something out of it though, and only if you have the spare capacity.

Now I have to be honest and say that it would be almost impossible to gain a client list having had no experience working as part of another enterprise or organization. So, if possible, find a role within one of the consulting practices or non-profit organizations that are used to working with a variety of different clients with different needs who require all kinds of different solutions: some need strategic planning; others are motivated by innovation pipelines whilst others are keen to just stay abreast of trends and apply them to their businesses without lots of workshopping. Of course, many do want you to facilitate board discussions or company foresight initiatives.

At this stage you probably don't know exactly which of these areas you want to work in, or where you individually excel. It is important to get a taste of as much as you can so apply for and take paid roles at consultancies, research agencies, think tanks, everywhere you can -- even if those roles that are temporary in nature. Here you will learn that most futures and foresight work is about relationship building as much as it is about tools and methods. You will get the opportunity to observe who does it well and who doesn't - and why.

Another option to consider is that if you have had a career before, you may have contacts who are interested in doing some foresight work. You might reach out to them and offer a series of workshops, some facilitated advisory work or consultancy that you are prepared to do without charge or at a reduced rate. Again, this is not with the expectation that you should be underpaid. There is a value exchange. If you agree to do the work for free for example, they need to agree to fully review your performance, your approach and the outcomes, and work with you to hone your process or your presentation. That is very well worthwhile. Think of it as a pilot (designing of a new product). You are testing out your theory work in practice but doing it in a way that sets the right expectations. Then agree with these partners that if they are happy with the end result that you may list them on your website as your founding client and add a glowing testimonial.

With some of this experience now delivered out in the wild, and your confidence hopefully grown, you're off and running!



FUTURES LITERACY: IMAGINING AN ALTERNATIVE TO OBEDIENCE AND AUTHORITY

By Riel Miller

Image source: Canva

Imagine a world in which no human obeyed another human because of fear, or rank, or expected benefits.

What an undesirable fantasy, without the constraints and guiding forces of established authority, the continuity of known punishments and rewards, no one would work or acquiesce to the laws of land and property. Released from the authority of the boss, teacher, or leader, murder and mayhem would prevail. Even progress and order, not to mention the fruits of innovation and betterment through competition, would disappear without the majesty of entrenched authority and the authority of entrenched majesty. Furthermore, such a scenario is totally unrealistic, at odds with 'human nature' and history. No one imagines such ridiculous worlds, don't give it a second thought.

The thing is – people can and do imagine such worlds, across different cultures and languages. Regularly and consistently, when invited to wander in the non-probable and non-preferable imaginary landscapes of a Futures Literacy Laboratory (Miller, 2018). In hundreds of co-created ['living laboratories'](#) people have been invited to embrace reasons and methods for imagining the future that go beyond the obsession with colonizing tomorrow by controlling what happens. All around the world, hailing from all walks of life, the participants of Futures Literacy Labs have applied their collective intelligence to imagining worlds that break the confines of today's prevalent and very ancient 'monumentalist' and bureaucratic social orders. They imagine communities that function outside the box of millennia old systems of authority and obedience,

commandments and 'preservationism,' continuity and control.

Seduced and diminished by ex-post stories of heroic winners, the conquerors of tomorrow, purveyors of monocultures of the imagination, wonder and joy evaporate, alienation overwhelms the meaning of novelty, emergence, improvisation, and ephemerality. Being is reduced to making bets, picking winners. Perception narrowed down to the calculation of the probabilities of 'being right.' Prestige dissolves into legacy, the heavy hand of path-dependency, fear of difference, and antipathy to change. Instead of cultivating the capacity and confidence needed to celebrate the unexpected, the creative gifts of a novelty-enabled universe, we build bastions of continuity, crafting the fragility and brittleness of stability at any cost, refusing the agility and resilience of diversification, the dance of birth and death that are the only path to experimentalist resilience. We laud intelligence not wisdom.

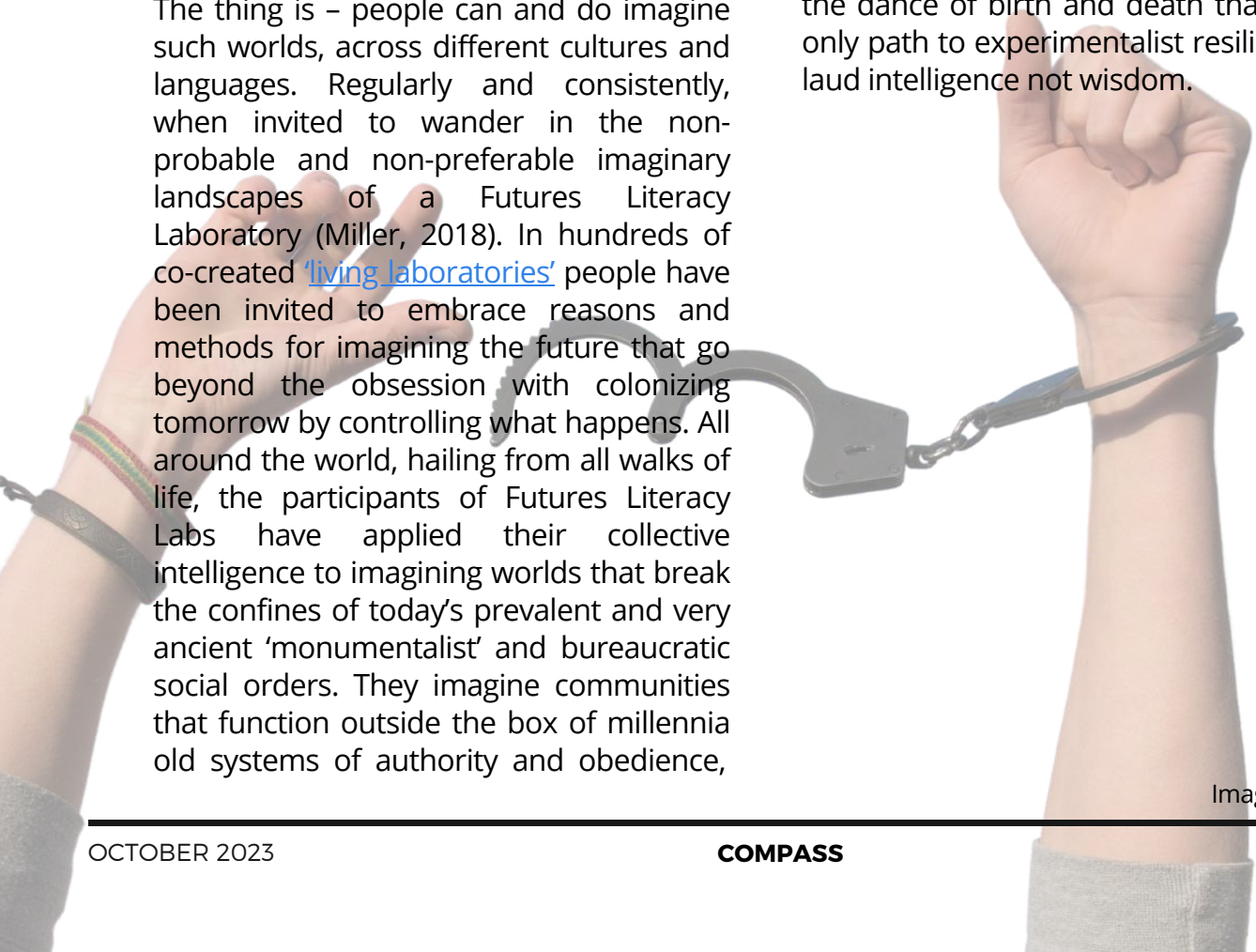


Image source: Canva



Futures Literacy Labs 2012 - 2016

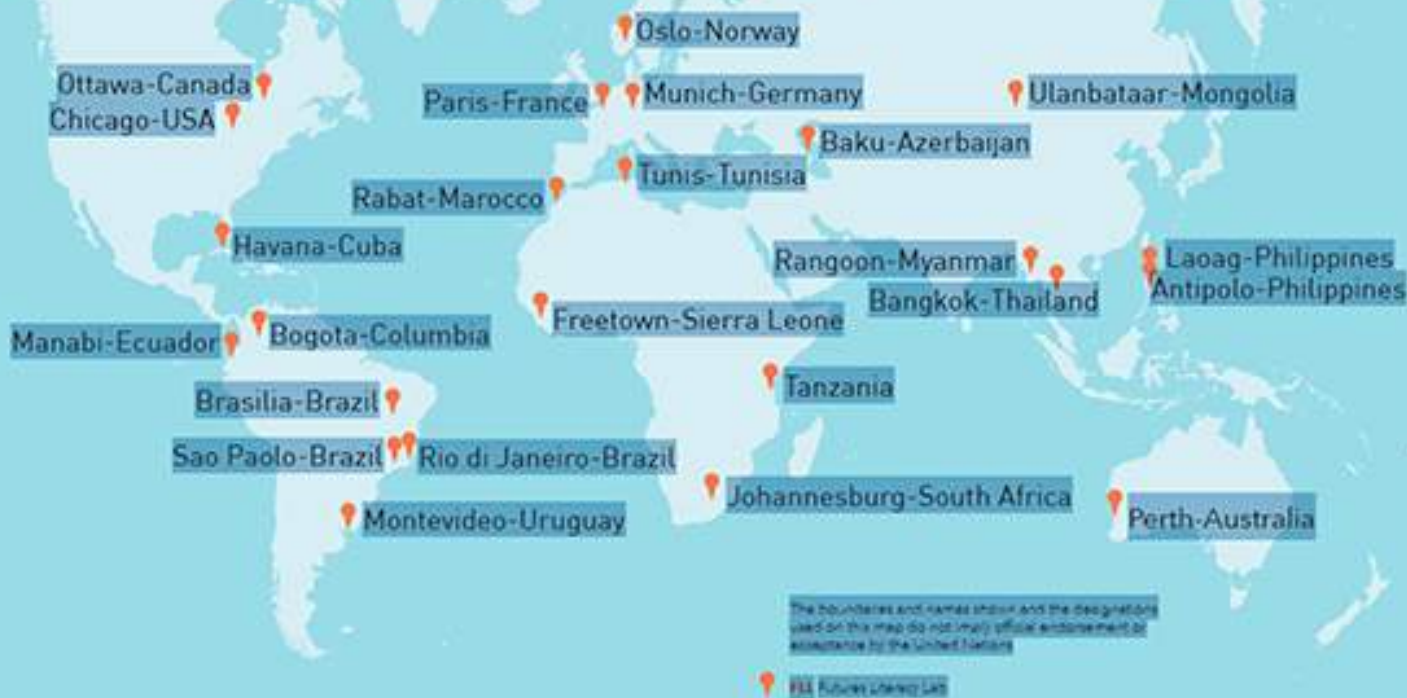


Image source: Unesco.org

WHAT'S THE POINT OF IMAGINED FUTURES?

Unleashing the imagination from the confines of probability and teleology (pursuing goals) may be doable, but why bother? If imagined futures are not being used to prepare or, plan for the future, what's the point?

One answer is that an explicit awareness of the diversity of reasons and methods for imagining the future opens a bridge or door to recasting the positionings of human agency, the vantage points for formulating our intentions and volition. Call it an escape hatch from the long-standing and ultimately self-annihilating arrogance of pursuing superiority over everything, from other humans to the universe that surrounds us.

Exploring such a path, diving into understanding human anticipatory systems and processes beyond the predictive, expanding the why and how of imagining the not-past, not present, points to a radically different scenario. One in which targeting a specific fulcrum that could change the conditions of change (yes, an intertwined double movement) alters the relationship of humans to the creativity of the universe. Could humans be nourished, rather terrified by the differences that are change, abandoning our vain (both senses) attempts to stand apart from the flow of the emergent present?

What makes these two 'appendages' of our imagination different is that one is dedicated to planning and the other to enabling perception in the present to escape from the confines of planning. The

importance of identifying and respecting the fundamental (ontological) difference between these two imaginaries is both the inescapable necessity of constantly making irrevocable bets based on whatever version of credible/legitimate certainty prevails at the moment, and the equally incessant emergence right now of the novel and unknowable in advance. Furthermore, paradigmatic distinctiveness applies, since these two categories of the human imagination do not use the same concepts, methods (epistemologies), or goals. One is about knowing and the other about not-knowing.

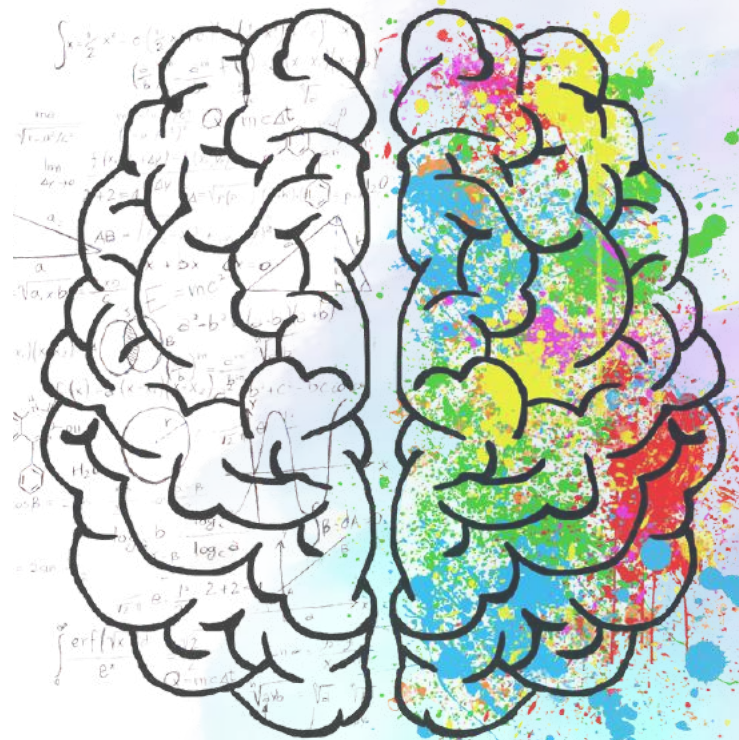


Image source: Canva

But it is not enough to grasp the distinctiveness of the two legs, it is also – at this point in human history – essential to recognize that for most of humanity the importance of the ‘other’ leg and the relationship between the two legs – remains invisible. Which, in turn, means that we live at a time prior to any of the changes in the conditions of change that might be wrought by the advent of widespread futures literacy. As Edgar Morin, the French philosopher, has put it “we live in the prehistory” of our species.

WIDESPREAD CULTIVATION OF FUTURES LITERACY

The seed of this ‘What if?’ is the framing assumption that somehow there emerges a set of learning/transmission habits (maybe evolutionary progeny of indigenous wisdom facilitating processes (Yunkaporta, 2020; Sveiby and Skuthorpe, 2006)) that enable the renewed and widespread cultivation of futures literacy such that all humans acquire a practical awareness of the role and the impact of different reasons and methods for imagining the not-present, not-past. If this were the case, how might it change our relationships to continuity and discontinuity, planning and improvisation, legacy and spontaneity, generality, and specificity? Could the fears and comforts, alienation and despair that describe so much of the last few millennia fade into the memories of childhood’s past? Would we still need to ‘resort’ to ‘separated’ incarnations of moral authority, enforcers of the collective that disintegrate without mechanisms of punishment, surveillance, and the uniformities of scalable massification?

Imagining human life as exuberant difference seems in keeping with the joys of a universe that is creative.

Only I cannot even begin to imagine the actual workings of such a non-teleological, non-hierarchical way of being. Not because of a lack of political alternatives, as there is a long and inspiring constellation of various utopian scenarios anchored in the critique of extractive/authoritarian social orders, but because all of those agentic frames are teleological -- wrapped in the garb of progress and the aspirations/morality of creating a better future ([Miller, 2022](#)).

From a futures literacy perspective, or more accurately the dominance today of futures illiteracy, the phenomena that might serve as the conditions for imagining the unimaginable do not exist – hence the unimaginability.

So how can I know if a futures literate future is a better future?

How can I know how to construct or pursue such a future?

What are the policies, formulas, admonitions to ‘make a difference’, to proclaim ‘what is to be done,’ that so dominate today’s search for hope?

I do not know, and I don’t want to. For these would be the wrong questions – the ones that simply reproduce a crushing fear of not-knowing and the desperate and narcissistic pursuit of winning.

Instead, what about ramping up capability-based conceptions of reciprocity – what we gift to each other – particularly by inverting

the typical effort to know what we are 'giving' to the future? Accepting that we do not know and cannot know and are not acting in the name of an unknowable future but in our own name, our values now.

WIELDING OUR IMAGINATION

The idea is to redress the imbalance in why and how humans wield this spectacular aptitude – our imagination. Not as a solution or promise of transformation. Particularly since the concepts, analysis, and conclusions are still too deeply rooted in the past, too tied to the dominant ontological and epistemic conventions, the pervasive tendrils of millennia of aspiring and promising salvation. The more modest hope is that we can spark some experiments, playing with transitional ideas, departures from the conventions, habits, rituals, and expectations of today's debilitating pre-occupation with colonizing tomorrow.

Enhancing the human capacity to be free is not a race for ultimate power and omnipotence, but an invitation to taste humility, experience an enhanced ability to sense and make-sense of difference, embrace change and ephemerality, live consciously with each other and with our universe, not against it. To become better able to listen and dance to the music of this universe, which like all music, is made up of the presence and absence of sound's vibrations, certainty and uncertainty, repetition and difference, knowing and

not-knowing combing into the song of being. And this dance combines choreography and preparation with improvisation and spontaneity in the moment – the authority or confidence that is the vitality of expressing the entanglements of life from within.



Riel Miller

Riel Miller is one of the world's leading authorities on the theory and practice of using the future to change what people see and do. He is recognized as an innovative and globally experienced project initiator, designer, and manager. He is widely published in academic journals and other media on a range of topics, from the future of the Internet to transforming strategic processes. He is an accomplished keynote speaker and facilitator. Riel Miller's lifelong ambition is to put the richness of complex emergence at the service of humanity's capacity to be free. To reach Riel, contact him through his [LinkedIn page: https://www.linkedin.com/in/rielmiller](https://www.linkedin.com/in/rielmiller)

THE MAN WHO DREW TOMORROW: EXPLORING THE FUTURE THROUGH DAN DARE

By Richard A. Slaughter



After the carnage and destruction of World War II the 1950s were a period of recovery and reconstruction for all those blighted by the conflict, which included those from South Coast cities, such as Portsmouth, U.K., where my generation grew up in the shadow of war.

Our parents had lived right through it since the Naval Dockyard was a prime military target. They carried the memories of terror and privation: narrow escapes, bomb shelters, explosions, and chaos. For kids, the conflict appeared in the form of ration books and bombsites -- echoes of something terrible beyond our experience.

As such it was a plain, unadorned life. Church on Sunday, occasional outings but, overall, greyish, local, limited. I was about 10 years old when something from another world fell into my hands -- a brightly illustrated comic called *The Eagle*. I had no idea where it came from, how it was made, by whom or why. All I knew is that week by week it fed my imagination and transported me elsewhere.

WORK OF GENIUS

The first thing to hit my color-starved eyes was the cover, red and yellow, with an elegant, stylized eagle over the top left panel. Then, underneath and to the right, was the main panel of the Dan Dare strip. Occasionally the whole front page would be taken up with a panoramic view of a scene in space, a detailed panorama of a future city, or the rolling waves of an alien ecology lit by strange suns. The strip carried over onto page two so there was always more to come.

The rest of *The Eagle* carried a number of black-and-white strips, short articles, competitions and so on. At the heart of the comic was a colorful two-page cutaway image displaying the interior structures of aircraft, ships, power stations and the like. Here, youngsters could satisfy a barely expressed desire to understand 'how things work.'

Later generations might well dismiss the *The Eagle's* presentation and content as somewhat conservative and culturally constrained. But to kids at the time, such concepts could not have been more remote. Looking back, it was a work of genius.

Dan and Digby landing on Terra Nova. F. Hampson, *The Eagle*, 1956.

Image Source: The Dan Dare Corporation Ltd



It was only much later that I discovered a whole generation of kids had had similar experiences. The Eagle in general, and the Dan Dare comic strip, in particular, drew us powerfully forward. They showed us that there was 'something' beyond the post-war world. And, in so doing, laid the foundations for positivity and hope. They lit within many youngsters an awareness that few could have grasped at the time – a view of the future that drew us towards it with a sense of promise and potential. As [a later writer](#) expressed it:

Britain had never seen anything like this before. In a decade of technological pessimism (the Bomb, the Cold War, etc) here was a comic with stories that were optimistic, intensely colourful and richly detailed, both visually and in their story line. And with the possibility of space travel fast becoming a reality, they contained the irresistible combination of realistic contemporary heroes fighting evil and tyranny in an exciting, imaginative and entirely believable parallel world."

This is, without doubt, the spark that marked the origins of my later career as a futurist / foresight practitioner. In the early 1980s I went to a British Science Fiction Association (BSFA) meeting in Brighton. It provided the one and only chance I had to meet and thank the person who stood at the center of the *Eagle's* success – Dan Dare's creator, Frank Hampson. I soon discovered, however, that during the early 1960s Hampson had been brutally treated

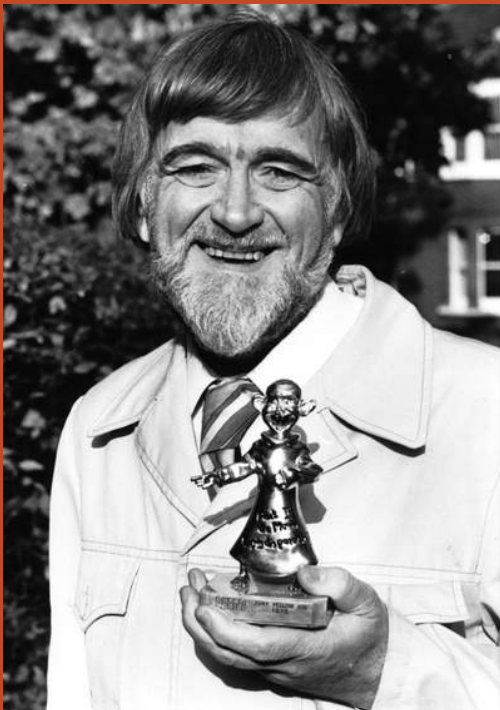


McHoo Masterpiece.
F. Hampson, The Eagle, 1959
 Image Source: The Dan Dare Corporation Ltd

by his publishers. While his creation continued to evolve, a fair share of royalties was denied to him. The fact that the 1950s were his most successful period makes the achievement even more ironic and remarkable. It also raises the question as to what else may help explain the near-legendary status accorded to his work over time.

MASTER DRAFTSMAN, CREDIBLE CHARACTERIZATION

Looking at the comics, then and now, it's immediately obvious that you're holding the work of a master draftsman. You can also see how Hampson inhabited his subject matter and filled it with texture and meaning. It's no accident that a later book about him was called [The Man Who Drew Tomorrow](#). It's exactly right. Even now, decades later, the vehicles, ships, spacecraft often look very much as though they still belong in the future. The sheer quality of the artwork is evident in the comic and the few original works I've seen are still considered unequalled in the genre. Nowadays a single original page layout can sell for perhaps AUD\$4,000 (about \$2,650 in US). Back in 1977, the Science Museum in London apparently agreed with the readership and set up its own [Dan Dare display](#).



Frank Hampson

Image Source: www.frankhampson.co.uk



Image source: Shutterstock

If Hampson's work was merely based on visual appeal, however, the strip would not have appeared so remarkable. Perhaps the underlying reason for his durable success was the artist's ability to render fully human characters, both male and female, and to embed them within a range of exquisitely rendered artificial and seemingly natural environments. His depiction of alien ecologies was exemplary and clearly drew on a deep understanding of natural form. One of the key characters was Sir Hubert Guest, Dan's superior. He cut a striking figure with his short grey hair and military bearing. There's a real shock therefore, for all who knew Sir Hubert as a comic strip character, when he appears, albeit briefly, in rare video footage as a living, breathing human being right there in Hampson's studio. He was actually Hampson's real-life father. Equally, Professor Peabody, who was no shrinking violet, was also based on a real person. Again, Hampson was ahead of the pack. It turned out later that Prof. Jocelyn Mabel Peabody was the [first female professor](#) illustrated in children's literature.



Professor Peabody. F. Hampson, The Eagle, 1959
Image Source: The Dan Dare Corporation Ltd



Dan, Stripey and recovering 'Phant' warrior.
Oil painting, R. Slaughter. 1978

Next to Dan himself, one of the most memorable and lively characters was Digby, his overweight batman, manservant, assistant and general dogsbody. Digby was quite obviously a comic relief and contrast to Dan. He was always in trouble, out of breath, falling over things, muttering under his breath. He imparted to the strip a note of human fallibility, streaked with humor. He exuded the sense that human fallibility was very much part of this future, but not really anything to worry about. In some of the stories a small striped animal known as Stripey made an appearance. His utterances were usually a variation on 'kuk, kuk, kuk, koo.'

GOOD AND EVIL

Dan's antithesis, and frequent enemy, was the [the Mekon](#), a small, evil genius, with an ugly, emaciated body and an oversized brain. He lived on Venus, a planet divided between his barbaric green-skinned Treen army and the floating cities of the peaceful Therons, in the south. If Dan represents positive human agency, the Mekon is cold intelligence and sheer instrumental power with no shred of humanity. He is instrumental reason gone mad. Dystopia. The Devil. Entropy. Death. The dynamic of many of Hampson's stories clearly derived from the age-old conflict between such polarized forces. One of the few things I recall clearly from hearing Hampson speak at Brighton was how Dan was partly modelled on an idealized notion of the British fighter pilot of World War Two. He was an embodiment of bravery and independence and would never flinch despite overwhelming odds. Hampson had a plaster bust of the character on his desk and could draw it from any direction.

Over the years he internalized the features of his hero and gave Dan a vital inner life. His signature feature was the quizzical, upward curving eyebrows that later artists tried to copy but often couldn't. I came to understand the problem myself when, in the late 1980s, I took colour slides of frames from the strip, blew them up and rendered them into oil paintings.

As time went by Hampson's place was taken by other artists, some of whom created legendary figures in their own right: Superman, Batman, Spiderman, Wonder Woman and so on. Unfortunately, however, as the 'superpowers' of these figures grew more outrageous, their



**Dan Dare. Voyage to Venus (re-issue),
Titan Books, 2004**

Image Source: The Dan Dare Corporation Ltd

human qualities seemed to diminish. The seemingly magic combination of depth characterization, exquisite artwork and positivity was lost. By the late 1960s, The Eagle was in decline and Hampson turned to other work. The comic was resurrected a number of times but the mass market versions of Dan Dare that followed tended to follow broader trends and become crude imitations of the mainstream: harsh, violent, and debased. More recently, however, several mainstream publishers have conserved the best of Hampson's work and made it available in more than one series of beautifully rendered hard copy art books.

LEGACY

Dan certainly remains a creature of his time and place. But it seems unlikely that he, his creator, and the team behind this remarkable work will be forgotten anytime soon. For me, Hampson's genius sparked a life-long sense of interest and involvement in the future. He seeded in my dawning awareness a view that, challenging though it undoubtedly is, the future can be positive, something to look forward to and which we can all help create in countless ways. Sure, there are plenty of 'Mekons' just about everywhere, and there always have been. But there are others who don't find the prospect of dystopia, technological overkill, the Matrix, overwhelming. A humanized future is just as achievable now as it was back then.

I'd like to think that Dan Dare is not just a child's fantasy but that there's a little bit of him – and what he represents - in just about everyone. Perhaps he was a 'pilot of the future' in more ways than one.



Richard A. Slaughter

Richard A. Slaughter, completed his Ph.D. in Futures Studies at Lancaster University in 1982. He later became internationally recognized as a futurist / foresight practitioner, author, editor, teacher and innovator. During the early 2000s he was Foundation Professor of Foresight at Swinburne University of Technology, Melbourne. He currently works out of Foresight International, Brisbane, Australia and can be reached at: foresightinternational.com.au.

Readers may like to hear two episodes of FuturePod (113 & 116) on the 'skewed narratives' of affluent nations and avoiding a Digital Dystopia, at futurepod.org. His recent book Deleting Dystopia can also be downloaded free of charge from: <https://usq.pressbooks.pub/deletingdystopia/>

**MEET YOUR APF
LEADERS:**

**Q&A WITH
ZAN
CHANDLER**



With this article, Compass begins a regular series where we invite APF members to learn more about the board members of the APF.

Q. Where do you live?

Toronto, Ontario, Canada.

Q. How long have you been a member of the APF?

Since November 2012.

Q. When did you join the APF board of directors?

January 2022.

Q. How did you learn about the APF?

The World Future Society (WFS) conference took place in Toronto in 2010 when I was a grad student in OCAD University's Strategic Foresight and Innovation Masters (SFI) program. The APF held a Professional Development (ProDev) day to which OCAD students were invited. So, I attended the conference and the ProDev to learn more about what it means to be someone who practices foresight. APF members Cindy Frewen, Mary Jane Naquin and Maree Conway were so welcoming at that event that I thought this could be a community that I would want to be part of. I decided to apply for Associate Membership as soon as I'd finished my studies.

Q. What do you do as a professional futurist?

I have worked on a broad range of foresight projects and processes as a researcher and facilitator, both as a grad student and with [KerrSmith Design](#). About six or seven years ago, I started teaching foresight methods in the SFI program. I am now working with [Policy Horizons Canada](#), the Government of Canada's Centre of Excellence in Foresight, where I am responsible for moving forward activities related to developing foresight capabilities in both Horizons staff as well as other federal public servants in Canada.

Q. Why do you love what you do?

This is arguably my third or fourth career, so it's clear I love to learn new things. I've been lucky to feed that desire by learning to become a foresight practitioner and working on projects across a range of industries and sectors. All projects afford the opportunity for learning, and as long as that's true about my work, I will continue to love it. That said, I think teaching feeds into this considerably. I do love working with folks who are learning about this field and are grappling with new ways of seeing, knowing, and doing. It's quite intoxicating to see their awakening and excitement at working in new ways, and to know that you had a hand in it.

Q. Why did you become a professional futurist?

Being a professional futurist allows me to do things I love -- exploring the past, finding patterns in what's changing, splashing about in the possible, collaborating with interesting thinkers and doers, being continually exposed to new ideas, ways of thinking, seeing, doing and being.

While I have a long professional history in the arts and cultural sector, I don't participate in the foresight space as a domain expert. Rather, I enter into this work with a focus on process and am continually learning new perspectives, methods, and techniques. Being a professional futurist means I'm able to work on a wide range of projects, and along the way, continue to learn from the experts I work with.

Q. How does being a Canadian inform your perspective as a professional futurist?

If Canada had been a different place, my family might not have chosen to come here. A racialized outsider perspective informs my practice more so than holding Canadian nationality specifically. Living in Canada (more specifically in Toronto) has meant I have been exposed to multiple (and often conflicting) perspectives on past, present and the futures: Indigenous, Black, and racialized communities, established settler communities and newer ones. Being born in the UK and raised there, in Barbados and in Canada have all greatly shaped how I see the world and therefore how I practice foresight.

Q. What do you value the most as a member of the APF?

Community! It is wonderful to be part of a global community of practitioners, thinkers and educators who are working toward better futures. We may do so in different ways and our visions of the future may take different shapes, but a desire to explore what the futures may hold is something we all share.



Q. What career advice would you give someone just entering the field of foresight?

Be curious! Be brave! Be humble!

Cultivate the curiosity of a child (or a cat) and experience and question all you can. The professional futurists I admire and have learned the most from are life-long learners who carry with them a sense of adventure. They are neither afraid nor dismissive of the edges, the margins and the strange. That said, they are also not too full of themselves. They acknowledge the wisdom and experience they've acquired over the years and are quick to recognize that knowledge and experience can look very different in others.

Q. Biggest accomplishment as a professional futurist, so far?

It is an immense pleasure and privilege to teach foresight and I'm grateful to my mentors for encouraging me to step up to the plate. I love the experience of helping to facilitate my students' journeys into learning something new and challenging. Many of them have gone on to win APF student recognition awards, start their own foresight practices, or lead foresight units in the public or private sector. I don't know if this is my biggest accomplishment but helping to ignite a passion for foresight is certainly the accomplishment of which I am most proud.



Q. If you were to recommend just one book to the readers of Compass, what would you recommend?

One book? Nope, not possible. So, I'm going to recommend a few -- Octavia Butler's *Parable of the Sower* by Octavia Butler, *Emergent Strategy* by adrienne maree brown, and *Braiding Sweetgrass* by Robin Wall Kimmerer.

Q. Knowing what you know now, what advice would you give your 18-year-old self?

- Learning how to learn (and how you learn best) will be more useful than the specifics of what you happen to learn. It will serve you well over a lifetime.
- Don't fret about finding "the" career. You'll have at least four or five of them in your lifetime.
- Figure out earlier rather than later how to deal with the unprocessed stuff from generations passed.
- Define and keep redefining what a good life looks like to you. Don't worry about what everyone else is doing.

Q. What do you do to fill your well as a professional futurist?

Read, listen to books and podcasts about a broad range of topics. I also like to go to art galleries and museums, and chat with people who are doing completely different things.

Q. What do you love to do for fun or to relax?

Bodies of water have spoken to me for decades. I'm happiest beside the sea or by a lake or river will do in a pinch. I like to cycle and walk, along shorelines, in forests or urban settings. I'm a book lover. I read (or listen to audiobooks) all the time.

Q. Poutine, Nanaimo bar, Ketchup chips or Timbits?

Poutine! If it's salty, carby and fatty, it's got my name all over it.

EXPLORING IMAGES OF THE FUTURE ON TVTROPES.ORG

By Simeon Spearman



Imagine a book, movie, or other work of media about artificial intelligence going crazy or otherwise generally being evil. For example, HAL 9000 in *2001: A Space Odyssey*.

Got it? Great.

You've likely pictured one of the more than 700 works of fiction that covers the idea of [AI gone bad](#) that is documented on [TV Tropes](#), a wiki that covers plot devices and storytelling conventions.

Unfortunately, the name of the web site hides the true depth of its information: the works analyzed are not limited to television and the "tropes" discussed do not fit the standard definition of a trope. The tropes are not limited to figurative words or expressions, or even strictly common or overused themes or devices. TV Tropes has a good breakdown of [how they define a trope](#), namely as a storytelling device or convention. In the eyes of the site, all stories are built using tropes, and the site's users document these tropes and their associated works for fun. (And, it really is fun. Give it a try.)

As I've used the site, I see more and more value in the information it holds for futurists.

By having a database of discrete images of the future, and how frequently they occur, futurists can begin to explore the origins of influential images of the future that permeate today's media environment.

So, how could we turn tropes into useful units of analysis for futurists? I've started using my limited knowledge of natural language processing (and a more proficient coding copilot named ChatGPT) to pull data after much trial and error to start quantifying different pieces of information about science fiction media and tropes contained on the site.



2D depiction of the interface prop used by Stanley Kubrick in his 1968 movie "2001: A space Odyssey" to represent the Artificial Intelligence named Hal. The movie is based in turn on Arthur C. Clarke's novels.

Image Source: Wikipedia

WHY TROPES?

Regardless of how you define a trope, there are many reasons to pay attention to them. An iconic image or reference, like the AI apocalypse shown in [The Terminator](#), can have an outsize influence on the thinking of those in power. Just like you and me have an image of the future in mind when asked about “AI gone crazy” many of our clients and stakeholders come to the table with their own biases shaped by popular culture as well. For better or worse, our current cultural moment surrounding artificial intelligence puts these images of the future up for critique. Where do they fall short. Where do they get it right? Where do they fail to prepare us?

The Terminator franchise’s influence on military thinking is a good proof point of why these tropes about the future matter.

In 2016, the Joint Chiefs of Staff within the U.S. Department of Defense were fixated on strategic questions straight out of *The Terminator*. Then-Vice Chairman of the Joint Chiefs of Staff General Paul Selva discussed what he and others called the “[Terminator conundrum](#).” He positioned the conundrum as follows:

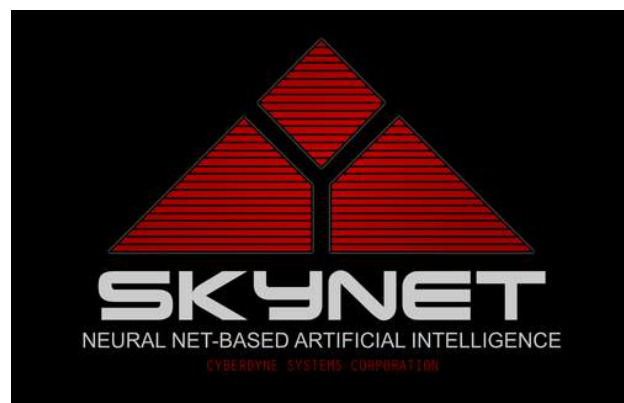
“What happens when that [machine] can inflict mortal harm and is empowered by artificial intelligence? How are we going to know what is in [its] mind?”

Meanwhile, then - Deputy Secretary of Defense Robert Work also referenced *The Terminator*:

“If our competitors go to Terminators ... and it turns out the Terminators are able to make decisions faster, even if they’re bad, how would we respond?”

More recently, *The New York Times*’ film critic A.O. Scott explicitly called out whether or not movies have in fact prepared us for the wrong artificial intelligence-driven disaster. The piece breaks down the A.I. futures presented by films such as [2001: A Space Odyssey](#) in contrast to depictions of A.I. in films such as [Her](#).

While society doesn’t always have a collective moment to reflect on images of the future, like we’re currently having in some corners thanks to A.I., the point still remains: images matter, they are influential, and we must understand more about how they permeate society.



Skynet, the artificial general superintelligence that is the main antagonist of the Terminator franchise.

Image Source: Tristar Pictures

AI rendering of a post-apocalyptic landscape inspired by Fallout: New Vegas.
Image Source: Mid Journey



AI rendering of a "cyberpunk city inspired by Blade Runner."
Image Source: Mid Journey



WHAT WE CAN LEARN

So, what can we explore when we quantify the data on TVTropes.org? Can we find the next trope that's going to infect the minds of the United States military industrial complex? Probably not! In fact, the easiest step is to just start diving into individual works and go from there – no coding required!

However, for those of you looking to go a little deeper, trope density and trope frequency can help us learn more than a list of tropes associated with one work of science fiction would.

EXPLORING MEDIA

Trope density explores how many tropes are packed into individual works. In the examples cited in this article, these capture **all** of the tropes associated with the work, not only tropes about science fiction and futuristic topics.

Let's look at the top five science fiction works with highest trope densities across film, video games, and literature: (see the images on next page)

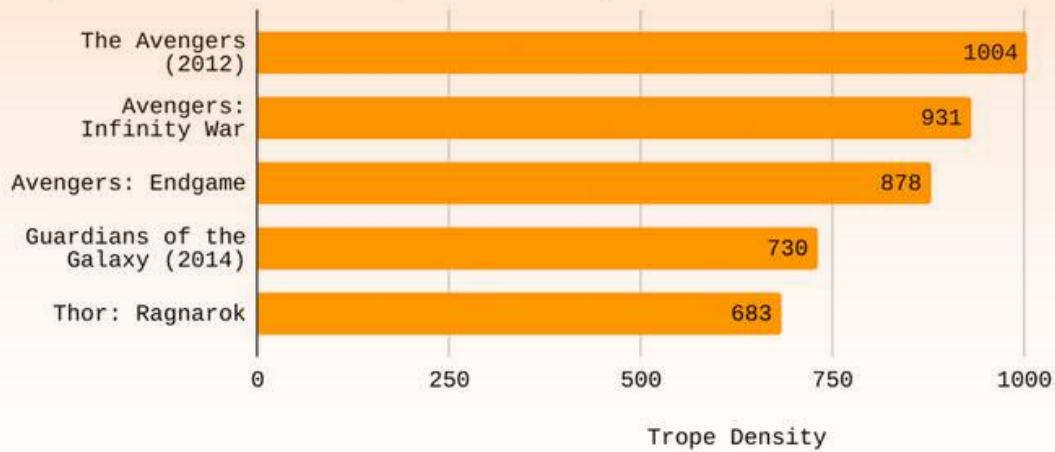
We'll dive more into this later. But isn't it interesting that [Disney](#) manages to cram a lot of storytelling conventions into its science fiction movies?

AI rendering of Mickey Mouse as Thor.

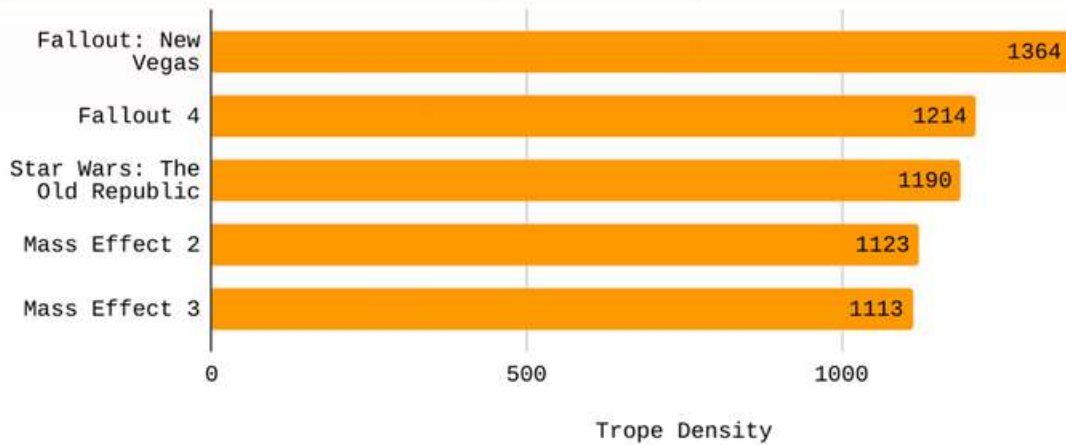
Image Source: MidJourney



Top 5 Films - Trope Density



Top 5 Video Games - Trope Density



Top 5 Literature - Trope Density



Open world games such as [Fallout](#) create more opportunities for storytelling through quests, side quests, and a multitude of environments to explore outside of the main story. Each of the games listed above provide robust, player-driven narratives that provide opportunities to explore many different science fiction-infused storylines.

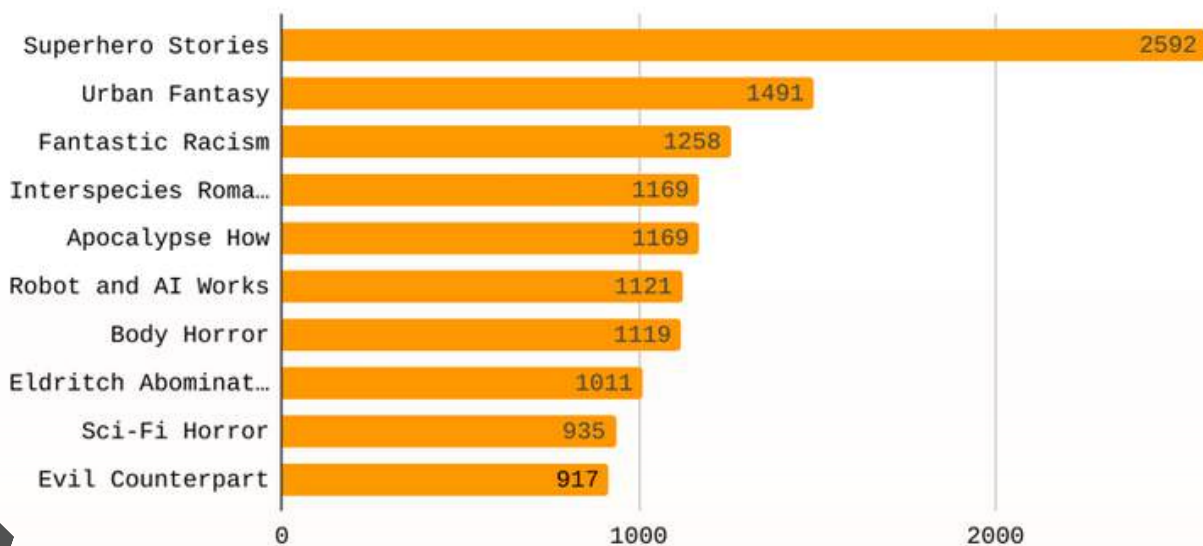
Honestly, I've read none of the above. But with [Sword Art Online](#) (a Japanese "light novel" series), we start to see how global perspectives are available from TV Tropes.

EXPLORING TROPES

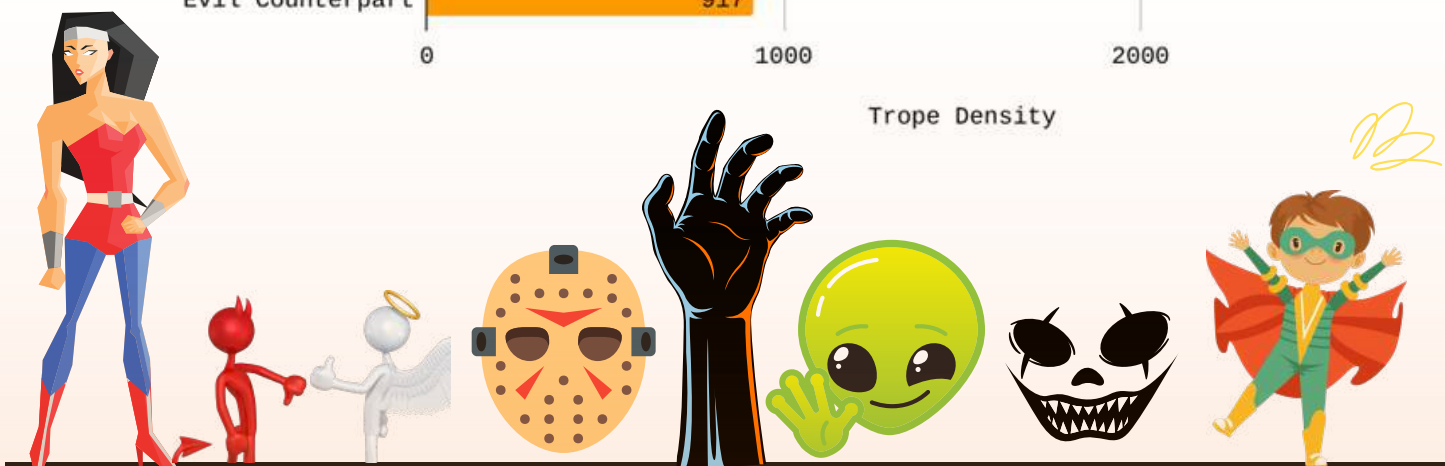
Trope frequency represents how often a trope occurs across a set of media. By looking at how many times a Trope occurs, we get a sense for how widespread and influential (and trite) it is in shaping popular opinions about the future.

When we look at the top 10 most frequently occurring speculative fiction and futuristic tech tropes, we establish a reasonable baseline of the types of speculative fiction that dominate popular culture.

Top 10 Speculative Fiction Tropes by Frequency



Trove Density



Given the high volume of “[Superhero Stories](#)” in our culture – is it any surprise that “the future” is so often depicted as a glitzed up special effects exercise à la [The Avengers](#) and [Guardians of the Galaxy](#), and not the more understated futures depicted in films such as Her and [Children of Men](#).

Going the trope analysis route, we also can analyze the different works associated with a trope to learn more about a specific storytelling convention and how it’s been applied over time. For example, we could look at “[Transhumanism](#)” on TV Tropes to see what other tropes occur most frequently within transhumanist works.

GOING DEEPER

When it comes to the implications, or potential, of studying these Tropes, I’ll provide an example and some thought starters that professional futurist could consider moving forward.

Box office/profits. The true potential of the dataset is to introduce data sources outside of TV Tropes to provide added context on how a work or Trope influences culture. For example, if we bring in box office data for our top 5 movies from earlier, what can we learn about the role of capitalism in disseminating stories about the future?

1. *The Avengers* (2012) - Box Office: \$1.52 billion
2. *Avengers: Infinity War* (2018) - \$2.04 billion
3. *Avengers: Endgame* (2019) - \$2.79 billion
4. *Guardians of the Galaxy* (2014) - \$771 million
5. *Thor: Ragnarok* (2017) - \$850 million

Temporal exploration. By adding metadata about publication and release dates, we could begin to see trends in the images of the future that rise and fall across generations. For example, [Fallout: New Vegas](#) and [Fallout 4](#) are both focused on nuclear post-apocalypse, but how do they, as works published in the 2000s, differ from nuclear-focused sci-fi from the middle of the 20th century when the threat was more tangible? What outdated fears about nuclear technology are perpetuated by retrofuturistic images of the future?

Cult classics. One hypothesis would be that analyzing cult classics could provide insights into what makes certain works influential. For example, *Blade Runner*, based on the 1968 Philip K. Dick cult classic novel, *Do Androids Dream of Electric Sheep*, was a not a box office success, and neither was *Blade Runner 2049*, but they’re both hugely influential in establishing a visual identity for the future that many people find compelling in cyberpunk film and video games. Exploring what makes cult classics “sticky” in peoples’ minds is another avenue of researching the data.

LET'S KEEP THIS GOING

Over time, I'd like to expand the data set to contain more information about all science fiction works -- not just the tropes and the amount of tropes associated with a given work. As you can see from the box office example, new insights begin to emerge as we add more information to the dataset.

From here, I'd love to encourage more people to [start exploring the data](#) and finding new ways to explore pop cultural images of the future and how they can be used more effectively within professional foresight.



Simeon Spearman

Simeon Spearman is a professional futurist based in Atlanta, Georgia. Currently, he works at Zendesk focusing on the application of emerging trends and foresight to shape thought leadership and brand strategy. Prior to Zendesk, Simeon worked at various companies and non-profits such as the Metro Atlanta Chamber, AT&T, and Publicis, spearheading marketing innovation and strategic foresight for advertising and communications teams.

SHOOTING FOR THE STARS: NEW PARADIGMS AND THE ROLE OF NEXTGEN LEADERS IN NAVIGATING THE FUTURE

Dr. Seren Dalkiran

مؤسسة دبي
FOUNDATION



APF 20TH Anniversary Future of
Futures: Voices of NextGen Leaders
in Navigating the Future Panel at
the Museum of the Future, Dubai.

We live in an era marked by unprecedented socio-economic and ecological challenges such as climate change, rising inequality, and disruptive technologies. Yet, from one crisis to another, an opportunity exists to transform the challenges we face into a future that allows humankind to move toward a new phase of collective evolution.

As a futurist and researcher, I am passionate about understanding the role of NextGen leaders (18-35 years) in facilitating and leading us through global change. How can a new generation of leaders help us – from Boomers to Beta Gen (those being born now) – to explore and define a new narrative and paradigms responsive to social and sustainable change?

What is needed to support them take on their leadership roles? What are their learning needs, what skill sets will they need to develop, and what values do they need to uphold to prepare them for what's next?

Furthermore, what role does foresight have to play in supporting NextGen leaders to become more resilient and better equipped to tackle these challenges they'll face 10, 20 or 30 years from now?

THE NEED FOR A NEW STORY

Cultural historians reflect that throughout the course of history, humans have always had a story to make sense of our time -- to understand how we got from the past to the present and to find a collective sense of direction for the future. This old story seems not to respond to our current transitional times, but our new story has

not emerged yet. We are in a liminal phase between stories, undergoing a rite of passage like the transition from adolescence to adulthood.

This transition reveals a couple burning questions: What is the emerging story of our time, and what is the role of young people in defining that story? What is the story of the younger generations who will take up leadership roles and drive meaningful and lasting change?

THE EXPLORATION OF NEW PARADIGMS AND NEW LEADERSHIP

In exploring a new story there is a need for new paradigms and approaches such as rethinking learning, leading, collaboration, designing organizations and communities, and doing business towards a paradigm shift centered on human and planetary flourishing and sustainability. What leadership do we need to explore new paradigms on multiple levels? How can we define a responsive leadership agenda for tackling these challenges?

As the leadership theorist Peter Drucker noted, "Every few hundred years in history there occurs a sharp transformation. Within a few short decades – society, its worldview, its basic values, its social and political structures, its arts, its institutions, rearranges itself. We are currently living through such a time."

HUMANIZING THE DIGITAL AGE

In this fast-paced digital age that we live, it is important to preserve and develop the human aspect alongside technological advancement. This involves nurturing multiple sources on human intelligence

alongside artificial intelligence (AI) focusing on worldviews, values, and skills that machines lack. Strengthening the cultural, social, and human spheres and considering this in innovation processes is vital. This is important for unlocking creativity and ingenuity for human and planetary flourishing. However, this will require a shift in mindset, behavior, and rethinking our worldviews and values to shape new paradigms. This leads to additional questions, such as:

- How can we humanize the digital age of techno-optimism for the benefit of people and the planet?
- How can we steer technological advancements to enhance the development of the human aspect serving our relationship with ourselves, our human-to-human relationships, our relationship to Earth, and also the human-machine interface dynamics to enable us to move to the next phase of our evolution within planetary boundaries?

- What kind of innovation is needed to achieve this?
- What is the true pursuit and meaning of innovation through this lens?

THE ROLE OF NEXT GEN LEADERSHIP

By 2025, Millennials will comprise 75% of the global workforce (U.S. Census Bureau, 2015). As the oldest Millennials reach 40-years-old, they have a pivotal leadership role to play in defining new leadership paradigms. Generation Z, followed by Alpha Gen and Beta Gen are right behind today's Millennials.

While younger generations have been dramatically affected by the Covid pandemic (80% of youth facing severe mental health issues, dubbed the "Pandemials," according to the World Economic Forum's Global Risk Report 2021), they are stepping up and taking leadership roles throughout our world on a number of major issues, such as climate



APF 20TH Anniversary Future of Futures: Voices of NextGen Leaders in Navigating the Future Panel at the Museum of the Future, Dubai.

change and social inequality. Amidst the “Fourth Industrial Revolution” and the movement toward a “Fifth,” they will need to navigate a world with a constant flurry of disruptions.

NextGen leaders are not sole targets for inclusion, but active collaborators in shaping the future prospects of our world. They play a critical role in the exploration of new paradigms and leadership. As Boomers and Gen Xers see Millennials and Gen Zers stepping into leadership roles, they need to ask themselves two important questions: *How can we equip these NextGen leaders with the skillsets of the future to become resilient and take up their role in social and sustainable change processes? And, how can generations cooperate across disciplines and sectors to enable this?*

SCIENTIFIC FRAMING FOR NEXTGEN TALKS

Over the course of my academic career, I have focused on the nexus of science and

society and theory and practice to drive 21st century leadership innovation in the exploration of new paradigms. I have established various global organizations and networks that bring values-based leaders across generations together to tackle the most pressing challenges of our time. I founded the [Synergized Earth Network \(SEN\)](#) and the Millennial Leadership Lab (MLL).

My Ph.D. research has delved into defining innovative paradigms capable of driving societal change and sustainable development. In particular, I have looked closely at whether Millennial leaders worldwide have an inclination to these emerging paradigms.

To generate data on a global scale, I conducted fieldwork with youth leadership networks in 28 countries across 6 continents, engaging more than 5,000 youth leaders. My integrated approach facilitated this Ph.D. study at the University



of Notre Dame Australia, Utrecht University, and Varna University of Management with the support from the esteemed Professor Geert Hofstede and market research firm Kantar Nederland and the Millennial Research Team. I collected quantitative and qualitative data in 117 countries representing Millennial leaders across diverse backgrounds. This work was recognized with the 2020 Emerald & HETL Outstanding Doctoral Research Awards.

My Ph.D. research insights emphasizes the potential of individuals and organizations to foster value-based leadership styles and stimulate learning cultures to fuel disruptive innovation and drive social and sustainable change. Toward this end, Millennial leaders value enabling learning environments that respond to their lifelong learning needs, cultivate values-based leadership, develop and align their personal and professional development. Developing the necessary skillsets to succeed in their need to be purposeful and thrive is significant for them to excel in their fields of occupation and drive meaningful and lasting impact in their contexts.

FUTURES AND FORESIGHT IN LEADERSHIP DEVELOPMENT

Through my research and fieldwork, I learned that futures and foresight have a critical role in addressing 21st-century challenges by helping individuals, organizations, and communities to become future-fit and future-proof. Bridging leadership development and futures and foresight practices is key to equipping NextGen (thought) leaders, futurists, foresight practitioners, innovators, creatives, professionals, and decision-makers with the resilience and tools needed to prepare them for the future.

For NextGen futurists, foresight is often a leadership capability to navigate global challenges and drive social and sustainable change. Foresight methodologies can empower NextGen leaders with strategic visioning tools to anticipate, prepare for, and shape preferred and alternative futures across generations, disciplines, and sectors. Facilitating NextGen leaders to equip themselves with foresight skills can help unleash their leadership potential.

CREATING A PLATFORM FOR NEXTGEN TO EXPLORE NEW LEADERSHIP PARADIGMS

So how will we get there?

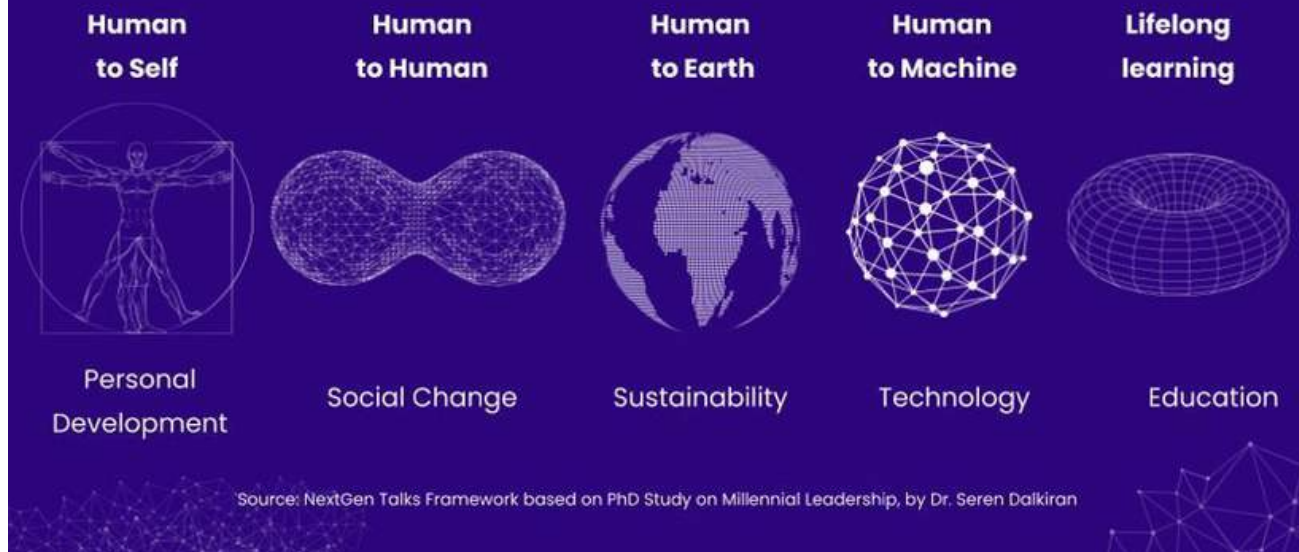
Based on my research and practice-based insights, I created a platform called [*Millennial Motion: The Next Generation of Leadership, also known as NextGen Talks.*](#)

NextGen Talks are events that bring together NextGen leaders globally who represent and navigate the future of various impact areas.

I organized NextGen Talks in many cities around the world to help Millennial and Gen Z leaders explore new paradigms and address pressing complex global challenges. In these talks youth leaders share their visions, real-life impact stories and the calls to action they feel leaders, including themselves, need to take to generate solutions to our world's most pressing challenges.

NextGen Talks helps to develop the leadership potential in youth leaders and provides them with the tools to drive social and sustainable change.

NextGen Talks Impact Areas



For example, at a recent edition of the NextGen Talks event within the MENA region, youth leaders explored five key areas of impact, which include 1.) human to self, 2.) human-to-human, 3.) human-to-Earth, 4.) human-to-machine interface, and 5.) education and lifelong learning as an underlying fabric to all the impact areas.

My participation in Expo2020, the first World Fair of Innovation that took place in the MENA region, and the Dubai Future Forum in December 2022, inspired to bring the NextGen Talks to the MENA region. This led me to conduct the NextGen Talks at the [Future of the Futures: Voices of Nextgen Leaders in Navigating the Future](#) panel moderated by futurist Dr. John A. Sweeney within the framework of the 20th Anniversary of the Association of Professional Futurists (APF) hosted by the Dubai Future Foundation (DFF) at the iconic Museum of the Future in Dubai in April 2023.

During this event, presentations were offered by NextGen leaders on navigating the future of each of these impact areas. These presentations offer examples of how NextGen leaders will approach the challenges of today, and tomorrow.

[Introduction New Paradigms, NextGen and the Global Perspective](#) by Dr. Seren Dalkiran.

[Introduction on NextGen and the MENA Perspective](#) by Modafar Akhoirshieda (APF Board Member, Founder Emkan Futures).

[Human to Self](#) (personal development and wellbeing) represented by Raghad Fatheddin, Founder of Sangha Estidama Hub.

[Human to Human](#) (social change) represented by Dana Shashaa, Community Architect at ATÖLYE.

APF 20TH Anniversary Future of Futures: Voices of NextGen Leaders in Navigating the Future Panel at the Museum of the Future, Dubai.



APF 20TH Anniversary Future of Futures: Voices of NextGen Leaders in Navigating the Future Panel with moderator Dr. John. A. Sweeney at the Museum of the Future, Dubai.

[Human to Earth](#) (sustainable development) represented by Haya Aseer, Arab Youth Center, Global Council on SDG13: Climate Action.

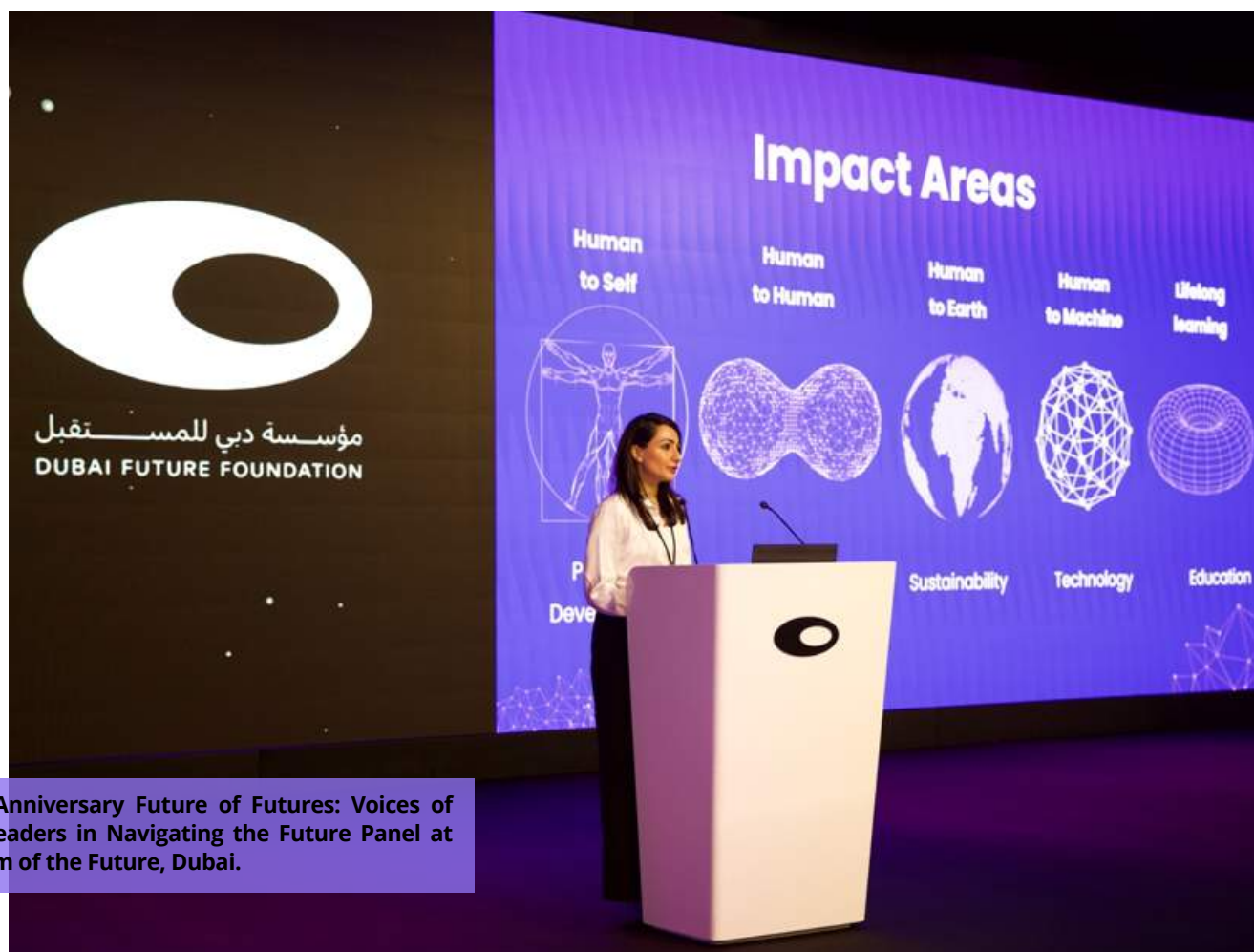
[Human to Machine Interface](#) (technology) represented by Mohamed Al Moosa, Program Manager (Governance in Tech) at the Pearl Initiative.

[Education & Lifelong Learning](#) - represented by Mae Dickinson, Head of Admissions and Growth and learner Brielle Luis at the School of Humanity (SoH).

During a NextGen Talks event, participants explore new and emerging paradigms that enhance human and planetary flourishing.

This includes discovering leadership styles to address global challenges, defining new leadership trajectories, equipping future generations with the skillsets of the future and cultivating resilience to enable them to become active collaborators in shaping the future prospects of our world. Intergenerational collaboration is key in this approach.

Following the *Strategic Visioning with NextGen Leaders in Navigating the Future* session, held at Area2071 in Dubai and hosted by ATÖLYE, a collaborative vision and strategy emerged across various impact area. This approach fosters the idea exchange among leaders in the wider



APF 20TH Anniversary Future of Futures: Voices of NextGen Leaders in Navigating the Future Panel at the Museum of the Future, Dubai.

ecosystem of futures and foresight, youth leadership networks, and sustainable development to continue to build an intergenerational world community. The session was a partnership with School of Humanity (SoH), Arab Youth Center, Global Council on SDG13: Climate Action, Pearl Initiative, Sangha Estidama Hub and with the support of One Young World Middle East and the Association of Professional Futurists (APF).

SYNERGIZED ACTION ACROSS GENERATIONS, DISCIPLINES AND SECTORS

It is vital that we move from working in silos to fostering synergy -- joining forces across generations, disciplines, and sectors to navigate a future that we are capable of co-creating together. It is a shared responsibility to shape a collective sense of direction, to find a common denominator and to facilitate the necessary outlets for this pursuit.



Strategic Visioning with NextGen Leaders in Navigating the Future session at ATÖLYE, Area2071, Dubai.

NextGen leaders are called to build upon the knowledge, expertise, experiences, and wisdom of the legacies that generations before have established while also becoming the authors of their own individual and collective stories, making their unique contributions towards a more just, sustainable and thriving future.

Living in such times of unprecedented crisis yet boundless opportunity prompts the pivotal question that civil rights legend John Lewis raised: “If not us, who? If not now, when?”



Dr. Seren Dalkiran

Dr. Seren Dalkiran is a professional futurist, innovator, and complexity scientist, she is the originator and founder of Synergized Earth Network (SEN) and founder of Millennial Leadership Lab (MLL), which are organizations that bring leaders across generations together to tackle the most pressing challenges of the 21st century. At the nexus of science and society she enhances collaboration across generations, disciplines, and sectors. Her focus is on equipping NextGen leaders to unlock their potential to drive meaningful and lasting impact for human and planetary flourishing.



FuturePod

WHAT'S NEXT ON THE FUTUREPOD?

Compass magazine is proud to collaborate with the FuturePod (futurepod.org) to highlight recent episodes featuring futurists and foresight professionals from around the world. FuturePod gathers voices from the international field of futures and foresight to allow the founders of the field as well as emerging leaders to share their stories, tools and experiences. To listen to recent and previous episodes, visit futurepod.org.

EP 164 : THE WILD WEST OF AI FUTURES - RICHARD YONCK

A return interview with Richard Yonck where he surveys what he calls the Wild West of AI Futures including digital assistants, job losses, human hybrid working, ethics and social media.

EP 163 : SCAFFOLDING COLLECTIVE RESILIENCE - ROWENA MORROW

A return interview with Rowena Morrow to hear about her work with Adaptive Cultures and the challenge of assisting organizations evolving their culture to better match their environmental complexity.

EP 162 : REDUCING AVOIDABLE SURPRISES - NORBERT KOLOS

An interview with Norbert Kołos, the managing partner and co-founder of 4CF, a strategic foresight consultancy, based in Poland, with nearly two decades of experience in complex foresight projects.

EP 161 : TOGETHER AND UNIQUE - FABIENNE GOUX-BAUDIMENT

A return interview with the French futurist, Fabienne Goux-Baudiment, who speaks to our emerging social evolution, Meritory Foresight, the new VUCA, artificial intelligence and gaming.

EP 160: EXPLORING LIMINALITY (WFSF 50TH ANNIVERSARY CONFERENCE) - HELGA VEIGL & MARTIN CALNAN

Helga Veigl and Martin Calnan talk about the upcoming 50th Anniversary conference for the World Futures Studies Federation which is being held in Paris on October 25-26, 2023.

EP 159: DECOLONIAL INCLUSIVE FUTURES - ZAN CHANDLER

Zan Chandler, a Foresight Analyst and Educator, helps clients, learners and mentees to understand the nature and implications of change and discover ways thrive in the face of complexity.

EP 158: FACING OUR FUTURES - NIKOLAS BADMINTON

Nikolas Badminton, FRSA, is a global futurist speaker that mentors top executives and the highest levels of government to explore desirable futures, anticipate unforeseen risks, and strengthen strategic planning.

EP 157: FUTURE THINKING MAVERICK- MAGGIE GREYSON

Maggie Greyson, MDes, APF, is an award-winning professional futurist and the CEO of Futures Present. This boutique agency helps people make decisions in times of extreme uncertainty using design and futures thinking practices.



BOOKS AND MEDIA



THE FUTURES EFFECT

By Jim Murray

In his book, *The Futures Effect*, Tom Myers discusses how a person can live a more fulfilling life by taking a more future-focused view. He uses his personal story of how he lived life with little direction or sense of purpose, going from one uninspiring career to another, culminating in a failed entrepreneurial adventure that brought him to an all-time low.

Myers chanced upon the field of osteopathy and connected with it based on its challenges and rewards. Without concern for his late start in the field, he motivated himself to successfully complete the education requirements and opened a private practice. Now he is sharing the secrets of his success, revealing that much of it can be attributed to a shift from living life day-to-day to living with a futures-focused mindset.

Myers is a licensed osteopath and body-centered stress coach with his own practice in Brussels, Belgium. According to his website, futuizeyourself.com, he lists many occupations in addition to osteopath including: “well-being futurist,” public speaker and author. He has done several speaking engagements and seminars centered on his first book, *Futuize Yourself: Design Your Life on Purpose*. Myers uses several excerpts and quotes from his first book, but I never got the sense it was a prerequisite for reading *The Futures Effect*.

Throughout *The Futures Effect*, Tom describes how developing and striving for a preferred future can give us direction and meaning for our present actions. He talks about how his own life suffered from not having a clear goal or direction, which typically resulted in him often “going with the flow,” and living life in a reactionary mode. Without something to aim for, his life lost meaning, resulting in depression and him questioning his own capabilities. Ultimately, the failure of his gourmet deli was his rock bottom, and the point that he realized he needed to do something to turn things around.

In many ways, the book can be considered a motivational/self-improvement book as much as a foresight/futures book. The basic idea is to use foresight practices on a personal level. Myers recommends a process that is very similar to many foresight methodologies — methodologies that are essentially problem-solving procedures, helping us define a path to navigate potential obstacles and shape a path to a preferred future, mitigating the negative effects of potential surprises. He also uses futures/foresight terms throughout the book such as “preferred” and “plausible” futures,

“scenarios,” “back-casting,” and even “mental time travel.” As he tells his story and describes the steps that he took to achieve success, you can see parallels to the basic foresight framework -- framing, scanning, forecasting, visioning, planning, and acting -- only Myers encourages you to apply it at a personal level.



Tom Meyers

In addition to developing our own preferred future, Myers encourages us to contribute to society’s future, specifically doing our part to combat climate change. He explains that we each have a personal future, and together, we have common shared or collective futures. He goes on to say that without the consideration of a specific preferred common collective future – saving the planet – all other futures essentially become irrelevant – similar to the message futurist Richard Slaughter has been exhorting for years!

There is little debate that it will take a concerted effort to address the wicked problem of climate change and preserve the Earth for generations to come. Hopefully, Myer's encouragement persuades more people to participate in the effort to save the planet.

Overall, *The Futures Effect* is a quick read and Myer's enthusiasm jumps off the pages. While many people already achieve success by thinking about and planning for their future, there are probably just as many that live their lives day-to-day. This book is for those day-to-day people. *The Futures Effect* is a testament to the benefits of looking into the future, setting goals, and living life with a sense of purpose by making decisions today to reach the future you prefer. If Myers can convince as many readers as possible to be more future conscious, the future is bound to be more promising.



Jim Murray

Jim Murray is a graduate of the University of Houston Masters in Foresight program. He is a part-time/aspiring futurist working full-time as the Packaging and Distribution Manager at The Washington Post. He retired in 2017 as a Colonel in the U.S. Army Reserve after 30 years of service. He currently resides with his family in Lorton, Virginia, and can be reached via his LinkedIn page at <https://www.linkedin.com/in/jim-murray-7106655b/>.



CLOSING THE LOOP: SYSTEMS THINKING FOR DESIGNERS

By Heba Alhadyian

In the *Journal of Futures Studies*, Special Issue: Design and Futures (Vol.1, March 2019), [Stuart Candy](#) and [Cher Potter](#) posed a compelling question: "How may designers systematically map out preferred futures, and what frameworks might futures studies furnish to help them?"

DESIGN AND FUTURES STUDIES: A SYMBIOTIC RELATIONSHIP

While design helps futures studies to humanize its verbal and theoretical approach for greater impact and influence, futures studies lends design a perspective to examine potential scenarios and futures that are influenced by the products, systems and services it creates. As these two disciplines intertwine, the need for each discipline to become proficient in the other language becomes evident. Sheryl Cababa, a design leader and the author of [Closing the Loop](#), spotted an opportunity to write a guide that teaches designers systems thinking.

BEYOND HUMAN-CENTERED DESIGN

This book comes at a pivotal point of accelerated change that challenges the business world to respond to the ramifications of our inventions as a humanity. As Candy and Potter noted, the design community recognizes the pitfalls of designing without a broader lens that allows the practitioner to examine each design decision's possible outcomes and consequences. This is a point with which the author leverages her argument of why designers need a mindset shift from Human Centered Design (HCD). She argues that HCD, a widely adopted design



Sheryl Cababa

Image source: Rosenfeld Media

philosophy, is no longer sufficient to deal with wicked problems but *how might designers use systems thinking to map out preferred futures? And what can we learn from this process as foresight practitioners?*

INITIAL THOUGHTS: TRADITIONAL DESIGN AND THE PARADIGM SHIFT

I came across *Closing the Loop* during a service design event where Cababa introduced her newly published book. As a futurist with a background in architecture and design, the premise intrigued me since I started my foresight journey after reflecting on the limitations of design strategy and research in Tech.

Cababa deeply understands user experience and service design and is known for her ability to integrate systems thinking into design practice and across various industries. She acknowledges the detrimental harm of the traditional approach to design with which the

problems are often isolated and solved in a linear fashion perpetuating systematic exclusionary effects as a consequence. Cababa emphasizes the need to understand the broader system in which a problem exists, recognizing that everything is connected, where changes in one part can have far-reaching effects on the whole.

In her work and throughout this book, Cababa advocates for a paradigm shift and provides tools and frameworks to guide design practitioners in exploring interconnectedness, alternatives, implications, and future envisioning. This is common knowledge for most of us futurists; however, that is not the case in design. A select group of practitioners can afford to explore these spaces, but for the majority, thinking in systems is either unheard of or intimidating. The accessibility and rigor on which this book is built positions it as one of the best resources for designers looking to incorporate systems thinking into their toolkits.

WHAT TO EXPECT?

The book contains nine chapters, each of which builds on the previous one.

In chapters one through three, the author sets the stage for systems thinking by highlighting the shortcomings of HCD.

Once oriented as a reader, in this case, the designer, she offers an array of tools, frameworks, and templates to showcase a systems-thinking design practice in action, in chapters four through six. This comprehensive section covers the research process a designer would typically go through starting with data collection, analysis, and synthesis. The difference is this research would inform the actual design process to uncover broader

insights about the current system in which the designer is working to solve a problem regardless of its size. The main takeaway in this section is to understand the system through mapping tools such as causal loops, systems archetypes, and the iceberg model. For times when the stakeholders need accessible tools, she suggests the fishbone framework as an alternative.

In the last three chapters, you can recognize the conversation shifts from understanding the system to thinking about the future through imagining alternatives and anticipating unintended consequences. Instead of traditional design's linear singular solution approach, the author reminds us of [multifinality](#). Considering multiple possible points of introducing change to the system (interventions) helps achieve desired outcomes. The Futures Wheel is one framework introduced to aid in the anticipation process. Designers have also been using similar tools to facilitate thinking about implications, such as [The Tarot Cards of Tech](#) and [The Ethical Explorer](#).

Finally, Cababa ends the book with a chapter on speculative design, where she closes the loop by illustrating why and how design can enhance our ability to think about the future.

WHAT CAN WE LEARN FROM THIS GUIDE AS FORESIGHT PRACTITIONERS?

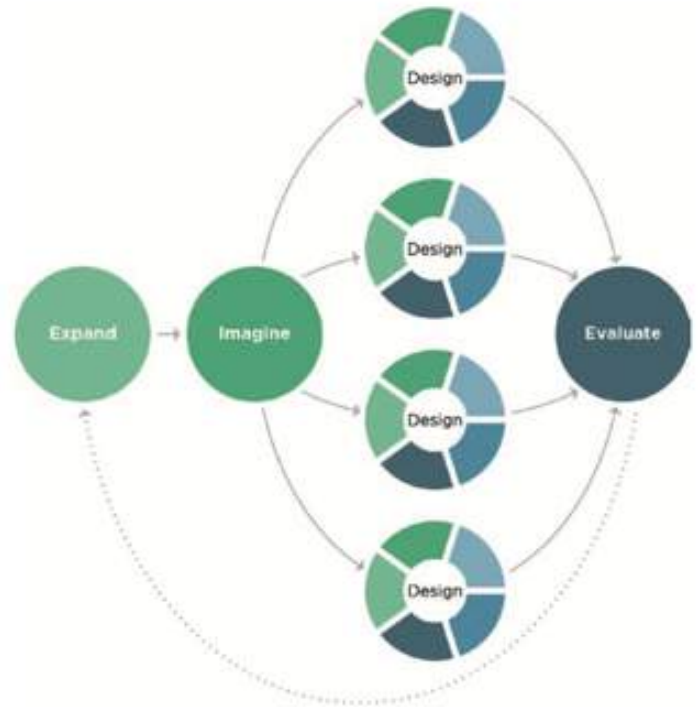
As designers continue to engage with the convergence of design and futures, incorporating systems thinking into their practice is essential. Cababa's work will undoubtedly contribute to the ongoing dialogue and toolkit development,

empowering designers to play a critical role in shaping preferred futures. And for many foresight practitioners, design methods have made it into their process.

Therefore, this book can serve as a supplemental guide for their practice. For practitioners unfamiliar with designerly ways of thinking, the author offers an opportunity for reflection.

1. When we work with members of a community to which we don't belong, we might end up (with the best of intentions) 'othering' the voices of these stakeholders. When designers or foresight practitioners attempt to build empathy or contextualize a system, they might unintentionally filter stakeholders' perspectives through their own biases, thereby diluting the authentic voices of those communities. This can inadvertently create a power imbalance between foresight practitioners and stakeholders, which can lead to a further disconnect between practitioners and stakeholders, particularly when working with vulnerable and underrepresented communities.

2. Speculative design and designers present the foresight community with a space to question how things are framed critically. By interrogating our positionality and cognitive limitations, we become conscious of alternatives and implications based on these questions that help us reframe future possibilities. Speculative design also can materialize high-level abstraction into concrete experiences with which we can engage our senses and emotions. For instance, Xiaowei Wang's "Blockchain Chicken Farm" delves into tech's effect on rural China,



Multiple Intervention Approach
Image source: Rosenfeld Media

	Traditional Design	Speculative and Critical Design (SCD)
Attitude	Normative	Critical
Foundation	Information	Speculation
Mindset	Pragmatic: Productive	Idealistic: Dreaming
Purpose	Commercial: Satisfy industry's need to make money	Discursive: Spur debate on the development of society
Goal	Develop solutions: Provide answers by solving problems	Explore ideas: Find problems by asking questions
Intent	Serve a user: In seriousness, provide clarity	Provoke an audience: Use ambiguity to make satire

Traditional vs Speculative Design
Image source: Rosenfeld Media

combining biometrics, drones, and blockchain with themes like farming. The book mixes nonfiction reports and speculative fiction, like a moon-grown food recipe, merging familiar and futuristic. Wang addresses societal issues, urging readers to ponder future disparities.

FINAL THOUGHTS

As a multidisciplinary designer, I thoroughly enjoyed this book. It definitely satisfied my curiosity and I plan to use it for my next project. As a foresight practitioner, it further solidified my understanding of systems thinking by reflecting on my thinking and decision-making. Lastly, designers who read this might feel motivated to use their influence, even in small ways, to help actualize thoughtful and equitable futures for generations to come.



Heba Al-Hadyian

Heba Al-Hadyian, an APF Emerging Fellow 2023-2025, partners with international public and private organizations to identify opportunities, solve problems, and co-create new ideas. She leverages an integrated approach of foresight and design to contextualize emergent issues, spark conversations, and harness participatory decision-making.



ADVANCING PROFESSIONAL FORESIGHT BY HELPING FUTURISTS PROMOTE THEIR UNIQUE VALUE, BUILD THEIR PROFESSIONAL NETWORKS, AND SHOWCASE THEIR PROFESSIONAL EXCELLENCE.

ASSOCIATION OF PROFESSIONAL FUTURISTS: OUR MISSION, VISION AND VALUES

ABOUT THE APF

The Association of Professional Futurists is a global community of futurists, dedicated to promoting professional excellence and demonstrating the value of strategic foresight and Futures Studies for their clients and/ or employers. Futurists work in global corporations, small businesses, consultancies, education, non-profits, and government. Celebrating our 20th anniversary, the APF includes more than 400 members from 40 countries.

APF sets the standard of excellence for foresight professionals. Members include futurists from businesses, governments, non-profits, consulting futurists, educators, and students in future studies.

OUR PURPOSE

To advance the practice of professional foresight by fostering a dynamic, global, diverse, and collaborative community of professional futurists and those committed to futures thinking who expand the understanding, use, and impact of foresight in service to their stakeholders and the world.

OUR VISION

A world where professional foresight guides decisions positively affecting the future.

GUIDING PRINCIPLES

The following principles will guide the behaviors of APF's Board, partners, and members:

Collaborative: We acknowledge our interdependence. We create and nurture relationships that are respectful, mutually beneficial, and generative.

Intergenerational equity: We work intergenerationally and act on behalf of current and future generations.

Open: We welcome all who share an interest in foresight. This includes professional futurists and those committed to futures thinking. We encourage innovation and ideas from members and partners who share our values.

Professionalism: We are committed to excellence and ethics in our conduct and work.



**“IT IS FASHIONABLE
NOWADAYS TO TALK ABOUT
THE ENDLESS RICHES OF THE
SEA. THE OCEAN IS REGARDED
AS A SORT OF BARGAIN-
BASEMENT, BUT I
DON'T AGREE WITH THAT
ESTIMATE. PEOPLE DON'T
REALIZE THAT WATER IN
THE LIQUID STATE IS VERY
RARE IN THE UNIVERSE. AWAY
FROM THE EARTH, IT
IS USUALLY A GAS. THIS
MOISTURE IS A BLESSED
TREASURE, AND IT IS OUR
BASIC DUTY IF WE DON'T
WANT TO COMMIT SUICIDE,
TO PRESERVE IT.”**

JACQUES YVES COUSTEAU

