EXPO 2020 إكسبو
دبي، الإمـــارات العربيـة المتحـدة
DUBAI, UNITED ARAB EMIRATES

المجلس العالمي
WORLD MAJLIS

WORLD MAJLIS REPORT

INSIGHTS FROM WATER WEEK

20th to 26th March 2022

What if we could benefit more from our water resources by protecting them?

Download the report or watch the full World Majlis session at:
virtualexpodubai.com/about-history/detail/world-majlis

This document has been prepared by the World Majlis team for Expo 2020.
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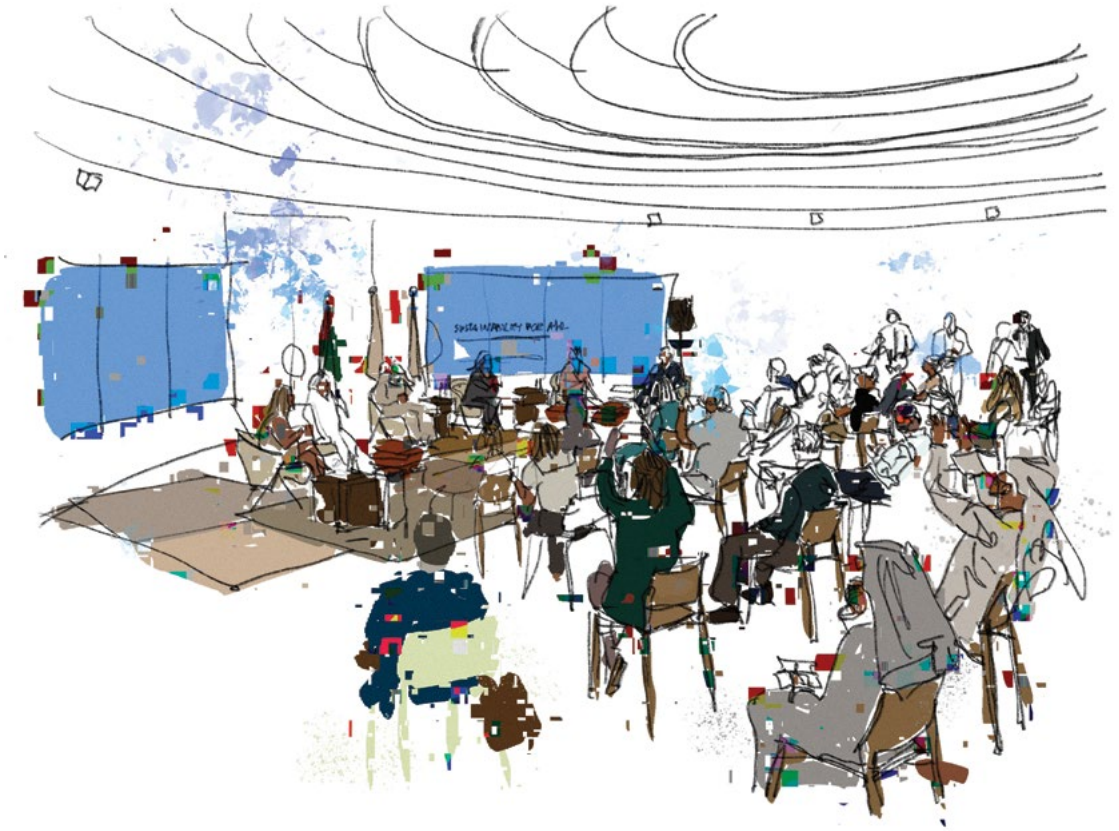
Deeply rooted in the traditions of the UAE, the majlis is one of the cornerstones of Emirati society, a space that welcomes friends and strangers to share news and ideas.

The Expo 2020 Dubai World Majlis is an inclusive, open and informal conversation space, physical and digital; one that brings together diverse voices from all over the world to reflect on complex challenges for the wellbeing of people and planet.



Between the 20th to 26th of March 2022, Expo 2020 hosted four World Majlis sessions to explore the theme of Water through the lenses of sustainability, gender and innovation.

1 **Deep Blue: The (Other) Final Frontier**

Undiscovered wonders of the oceans

Co-curated with Portugal

Can we derive greater benefit from the oceans without further disturbing their balance??

2 **Living Oceans**

Reversing our impact on marine ecosystems

How can we clean the oceans and marine ecosystem we have been polluting for decades?

3 **The Price of Water**

Decoding its value to our future

Co-curated with Switzerland

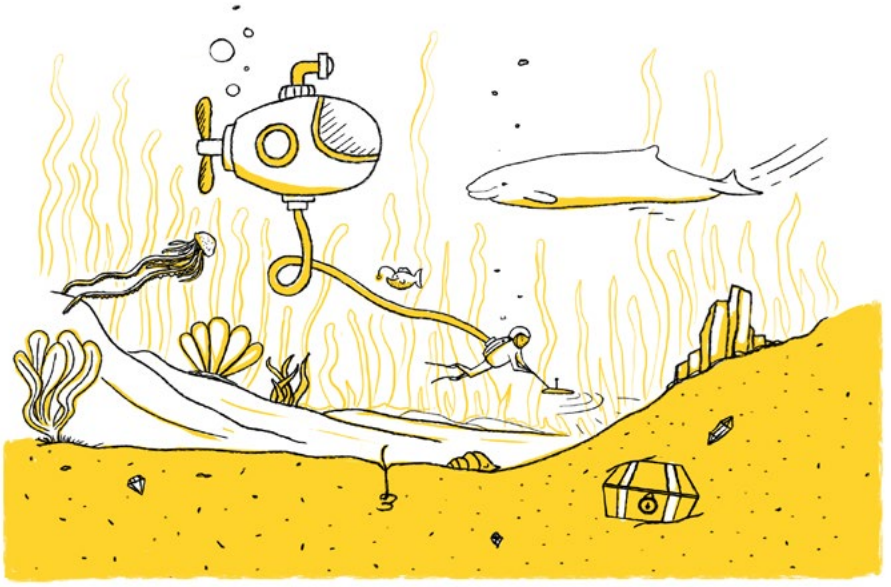
How do we put a price on our most valuable resource while also ensuring access to it as a human right?

4 **A Thirst for Equality**

Addressing the Challenges in Accessing Water Resources

In collaboration with the Women's Pavilion and Australia

In developing countries, the job of collecting water falls mostly on women and girls. It is a time-consuming and arduous task. How can we promote women's leadership in water governance and the blue economy?



PARTICIPANTS

Deep Blue: The (Other) Final Frontier

Undiscovered wonders of the oceans

Co-curated with Portugal

PORTUGAL
EXPO 2020 DUBAI

Terra – the Sustainability Pavilion
20th March 2022

Melania Guerra
Director, Science Strategy at Planet (Germany), Costa Rica

Jason Pratt
Senior Vice President – Group Health, Safety & Environment, DP World

John Defterios (Moderator)
Former CNN Emerging Markets Editor; Professor of Business, NYU-Abu Dhabi

Jamie Isbister
Ambassador for the Environment, Department of Foreign Affairs and Trade, Government of Australia

HE Ricardo da Piedade Abreu Serrão Santos
Minister of the Sea, Government of Portugal

Prof Burton Jones
Professor of Oceanography, Red Sea Research Center, King Abdullah University of Science and Technology, KSA

Kathleen Swalling
Maritime Law and Strategy Advisor Managing Director, Nature Based Solutions LLC, United Arab Emirates

Living Oceans

Reversing our impact on marine ecosystems

المجلس العالمي
WORLD MAJLIS

Terra – the Sustainability Pavilion
21st March 2022

Irène Hediger
Head of artists-in-labs, Zurich University of the Arts (Zürcher Hochschule der Künste), Switzerland

Jo Ruxton
Founder, Ocean Generation, UK

Dr P.E. Daniel MARIE
Officer in Charge, Mauritius Oceanography Institute (MOI)

Tom Hennes
Founder, Thinc Design, USA

Mohammed Slaise
Pearl diver and field researcher, DANAT Institute for Pearls & Gemstones, Kingdom of Bahrain

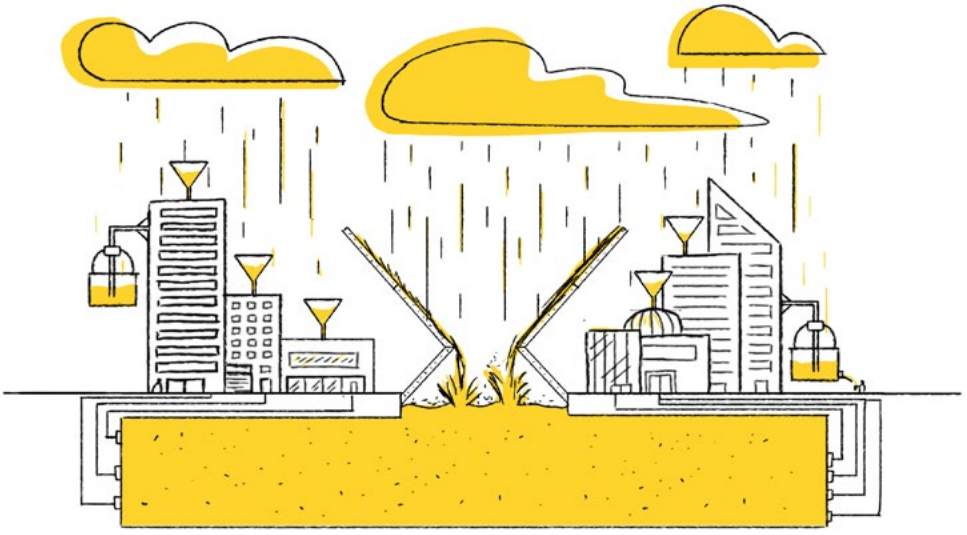
Jacqueline Sauzier
President, Mauritius Marine Conservation Society (MMCS)

Nina Jensen
CEO, REV Ocean, Norway

Prof Ir Dr Zaini Ujang
Secretary General, Ministry of Environment and Water, Government of Malaysia

John Defterios (Moderator)
Former CNN Emerging Markets Editor; Professor of Business, NYU-Abu Dhabi

Katia Nicolet
Scientist, Energy Observer Doctor, Marine Biology, France



PARTICIPANTS

The Price of Water

Decoding its value to our future

In collaboration with Switzerland

SWISS PAVILION
EXPO 2020 DUBAI

Terra – the Sustainability Pavilion
22nd March 2022

Dr Samer Aljishi
President, BFG International, Kingdom of Bahrain

Carlos Garriga
Director, We Are Water Foundation, Spain

Dr Abishek Sankara
Researcher, Department of Water, Sanitation and Solid Waste for Development, Eawag, Switzerland

Jamila Bargach
Executive Director, Dar Si Hmad for Development, Education and Culture, Morocco

Prof David Hannah, PhD
University of Birmingham, UK
UNESCO Chair in Water Sciences

John Defterios (Moderator)
Former CNN Emerging Markets Editor; Professor of Business, NYU-Abu Dhabi

Prof Asit K Biswas
Director, Water Management International, Singapore
Chief Executive, Third World Centre for Water Management, Mexico

Susan Moisio, P.E.
Global Director, Water Market – Jacobs, USA

A Thirst for Equality

Women's World Majlis: Addressing the Challenges in Accessing Water Resources

Co-curated with the Australia

جناح المرأة
WOMEN'S PAVILION

Women's Pavilion
24th March 2022

HE Ilya Espino de Marotta
Deputy Administrator and Vice President for Operations, Panama Canal Authority

The Honourable Karlene Maywald (Moderator)
South Australia Water Ambassador

Salma bin Breik
Advisory Leader, GHD Pty Ltd, United Arab Emirates

Fariel Salahuddin
Founder and Chief Executive Officer, UpTrade (Goats for Water), Pakistan

SUGGESTED ACTIONS AND INITIATIVES

For Government

OCEAN

- Develop policies built on the ocean as one shared recource for humanity [p23, 29, 36]
- Develop a cohesive, national-level strategy to protecting the health of the ocean. This is a global problem that requires solutions and implementation at the local level to be enforced [p48, 71]
- Jointly undertake policies for climate action based on the understanding of the ocean - climate nexus [p15, 23, 32, 37, 48, 53]
- Develop specific policies to address illegal fishing [p48, 50]
- Create sustainable solutions by bringing together diverse voices to the table, including scientists and indigenous communities [p19, 34, 38, 39, 51, 53]
- Use the precautionary principle to shape policies to protect the ocean and shape its future [p41, 43, 45]

WATER MANAGEMENT

- Develop ways to better value and price water according to local contexts [p20, 57, 61, 68]
- Invest in infrastructure to decentralise water supply, bringing it closer to users, and to improve efficiencies in the water supply [p61, 63]
- Increase funding for ocean health [p50]

For Businesses

COLLABORATION	Play a leadership role to identify opportunities, in collaboration with government, to invest in the protection of marine resources, and to scale-up solutions [p32, 37, 38, 48, 53]
	Collaborate with academia to cross-pollinate research and bring the latest thinking and research to the water industry [p52, 73]
INNOVATION	Invest in technology and encourage innovations that promote greater efficiency and sustainability of water management [p61, 63, 66, 73]
	Build ocean and water stewardship into new business models [p38, 41, 45, 57]

For Academia

WATER LITERACY	Begin water and ocean literacy in schools in early years to promote understanding of the value of our water and the need to protect it [p25, 34, 62, 63, 74]
NEW SKILLS	Create the next generation of marine and water management professionals with the skills to meet the demands of the future [p19, 23, 34, 51, 61, 66, 73]
	Expand academic research to develop economic and accounting models for natural reccources and specifically water [p34, 39, 52, 62]
RESEARCH AND KNOWLEDGE-SHARING	Promote graduate-level scientific research and foster communities of global knowledge-sharing [p57]

Connecting the ideas from 27 thought leaders from 18 countries has sparked new lines of inquiry for future conversations and research.

FUTURE INQUIRIES

How can we achieve a greater focus on ocean in climate action and upcoming COPs?

Is the deep ocean a new frontier for international cooperation?

Will seeing the one ocean as a single body of water helps us better value it?

How can governments develop stronger policies that connect ocean and climate action?

How can we fill the knowledge gaps in the ocean sector between the Global Southand North?

How can we disseminate knowledge more widely, fairly, and equitably so that everyone may benefit from and participate in ocean exploration and discovery?

Are we ready to apply the 'precautionary principle' as we explore new ocean recources?

How do we create urgency to create policies to address the challenges the ocean is facing?

How can we be sure that international policies and regulations are implemented at the local level?

How can indigenous wisdom shape our relationship to the ocean?

Can we accelerate international cooperation on the ocean and align with lessons from space?

How can we incentivise and increase support for local communities to manage and protect coasts and ocean?

How can water accounting and that of other natural resources be implemented?

Can decentralised water provision in rural communities be a solution for preventing flight to urban areas?

What is the role of universities to spearhead new areas of research and innovation?

Are companies across all sectors willing to rethink their business models in favour of water stewardship?

CONTEXT

Water is the source and sustenance of life on earth. From the chemistry of its molecules to its powerful physical force, it has shaped human civilisations, sustained diverse ecosystems, driven food supply, and has modulated the earth's climate for the last 11,000 years. Water plays a vital role in health, agriculture, biodiversity, climate, geopolitics, culture and religion.

Despite the enormous volume of water on our planet, only 1 percent of it is available as drinking water, critical to all societies. It is the blue ribbon that runs through all the Sustainable Development Goals (SDGs). Lack of fresh drinking water leads to detrimental health and educational and social impacts.

It is anticipated that demand for water will exceed supply by 40 percent by 2030. The rise in population, urbanisation, and climate change, will all increase this demand for water. Today, over 2 billion people do not have clean drinking water, with a disproportionate effect on gender. Much of the world—primarily women and girls—spend inordinate amounts of time collecting water. This has knock-on effects on several other SDGs.

The ocean is the largest body of water on earth, containing 97% of the water on the planet. It is intricately linked to our climate and it gives us immeasurable environmental services. It absorbs almost a quarter of the annual global carbon dioxide (CO2) emissions. And it has absorbed more than 90 percent of the excess heat caused by greenhouse gases. Anthropogenic activities are chocking the ocean with plastic, reducing its biodiversity, increasing its temperature and making it more acidic. Yet, despite these critical links to climate, many people consider that it does not feature prominently enough in current climate conversations.

Water also has tremendous socio-economic value to us. The ocean is the main trading route of the planet. It facilitates movements for over 90 percent of all the goods we trade. And we are tapping into ocean economy for offshore wind energy, aquaculture, and marine biotechnologies. More than three billion people across the world rely on the ocean for their survival, with the ocean-related jobs, including fisheries and tourism, providing their main source of income.

More than two-thirds of the earth's crust lies under the ocean. Large reserves of metals and minerals such as cobalt, lithium and manganese—resources that are driving digitisation and the Fourth Industrial Revolution—lie deep within the ocean bed. As we harness technologies to exploit these resources, we risk losing marine ecosystems and biodiversity that we have not yet explored.

Unless carefully protected, exploitation will re-map geopolitical boundaries, potentially raising the risk of conflict and unequal distribution of the resources. A sound way forward may be to think about the ocean in the ways that humans have collaborated in Antarctica, and outer space including the moon and Mars.

These pressures on our most valuable resource will only increase as population rises: As we cross the 9-billion mark, the growth in human population will impact the water-energy-food nexus in ways that are highly unpredictable.

Emerging questions for future conversations

How can we achieve a greater focus on ocean in climate action and upcoming COPs?

Is the deep ocean a new frontier for international cooperation?

THINKING DIFFERENTLY ABOUT WATER

Today there is no shortage of technological solutions to address the challenges we face with our water. However, what we need are new ways to think about water, including how we value our oceans and our domestic water.

The water-climate nexus

Water is the climate connector, so much so that we need to think about the nexus between water and climate.. The ocean is both massively impacted by climate, but also acts as a second lung for the planet and its potential for solution is equally important. Water, more broadly, is itself critically connected to other climate driving resources, such as energy and food. According to many participants this way of thinking can help to create a much needed paradigm shift from previous COPs where water and ocean do not fit as prominently as they should.

Seeing the world from the perspective of space

We need to think about our ocean from the same perspective that astronauts saw earth—as a striking, colourful, and beautiful sphere that we call home. In doing so, we can manage our water better and create robust legal frameworks for protecting the planet, our ocean, and the biosphere. When we view the earth holistically, we encourage a paradigm shift away from a human-centric perspective and acknowledge that we share the planet with other living creatures with whom we are inextricably linked.

The deep ocean belongs to all of us

The deep ocean should be seen and treated as the property of all humanity. Effective legal systems and enforcement mechanisms are required to protect marine environments and biodiversity that sustain life on the planet. We need to bring varied ideas and stakeholders to the table to make these frameworks sustainable in the long run. To ensure the future we want, international organisations, governments, indigenous groups, scientists, and international and environmental legal experts must all have a seat at the table with an equal voice.

Nature provides innovative solutions

Nature-based solutions such as increasing mangrove forests, or encouraging the growth of phytoplankton to absorb carbon dioxide (CO2), can provide vital ways to manage our water resources. Nature-based innovations, alongside technological ones, can address challenges of water supply and mitigate hazards effectively.

Bring water closer to people

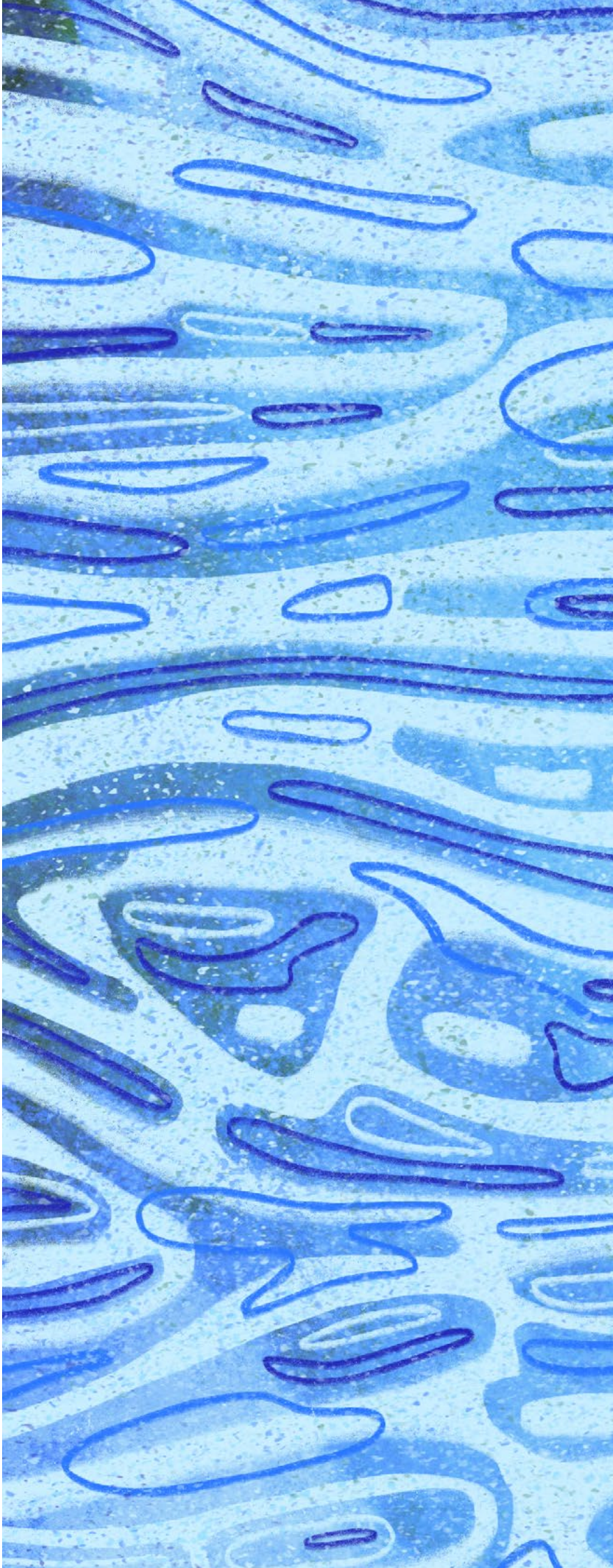
While we have focussed on centralized systems to supply water, millions of people in rural communities do not have access because they cannot be reached by infrastructure. Smaller, decentralised water supply systems can be a game changer in bringing safe drinking water to more people where centralised systems have fallen short. With off-grid technologies maturing, there are a number of innovations available today that enable more circular systems.

Changing our mindset around the value of water

We need to start thinking about the value of water, the social and environmental services it provides, as well as its real cost. By developing metrics to value the ocean's ecosystems and their services, and better understanding the value of our domestic water supply, collectively we can take measures to protect our most valuable resource.

"When I first joined, I realized, I'm with a bunch of scientists and where am I going to help or where am I going to fit? But after going through the first project, I realised how much my input was so important for the whole team to create the types of researchers or try to pinpoint what they're looking for. I found my use for them, being in the environment the whole time and knowing what changes and what things look like all the time. The scientist doesn't know, they're just using numbers and they're using data. But I know that I can see, like even pinpointing locations of where to do the research. Being in the sea, I know where the oysters will grow and where the oysters won't grow because of practice or because of the experience."

Mohammed Slaise



Almost 2 billion people don't have access to clean water on a daily basis.

OUR ONE OCEAN

By recognizing the ocean as a single, finite body, linking economy, biosphere and climate, we set the stage for greater stewardship of this valuable resource. Science and technology innovations, coupled with local knowledge are helping us to better understand previously unknown dynamics of the ocean and to take steps to protect it as a vital resource for our future.

Pale blue dot

From deep in space, the earth's iconic blue colour reminds of us of the ubiquitous presence of water on the planet's surface. When viewed from a particular vantage in space, we see a vast expanse of blue liquid—the earth is more than 70 percent water, most of it being the ocean.

Although, we often think of 'oceans' as multiple bodies of water, this is a misrepresentation. The 'oceans' is one single body of water stretching across thousands of kilometres, interlinking people and planet. The one ocean becomes even clearer in a map projection centred on Antarctica.

By recognising the ocean as a single interconnected entity, we can set the stage to protect it better, to shape a future that is more sustainable and more equitable for people and planet.

> **It's one ocean, we can't think of it as separately. Water circulation through the ocean takes about a thousand years. So, if you put something in the ocean in eastern Canada and New Brunswick, in about a thousand years, it will reappear there, but it will work its way around through the Indian Ocean, through the Pacific Ocean and into the Atlantic.**
>
> – Burton Jones

> **When we look at it, we really have to think about it as one single source of water. So, all of us, no matter where we're located, are intimately linked with that one ocean, that one primary source of water.**
>
> – Burton Jones

"It became really clear that when we talked about 'the oceans', it was a misnomer that it's actually just the ocean. All of them are connected. We cannot think of it a separate oceans,as silos where things happen independently from the other oceans."
Melania Guerra

1.

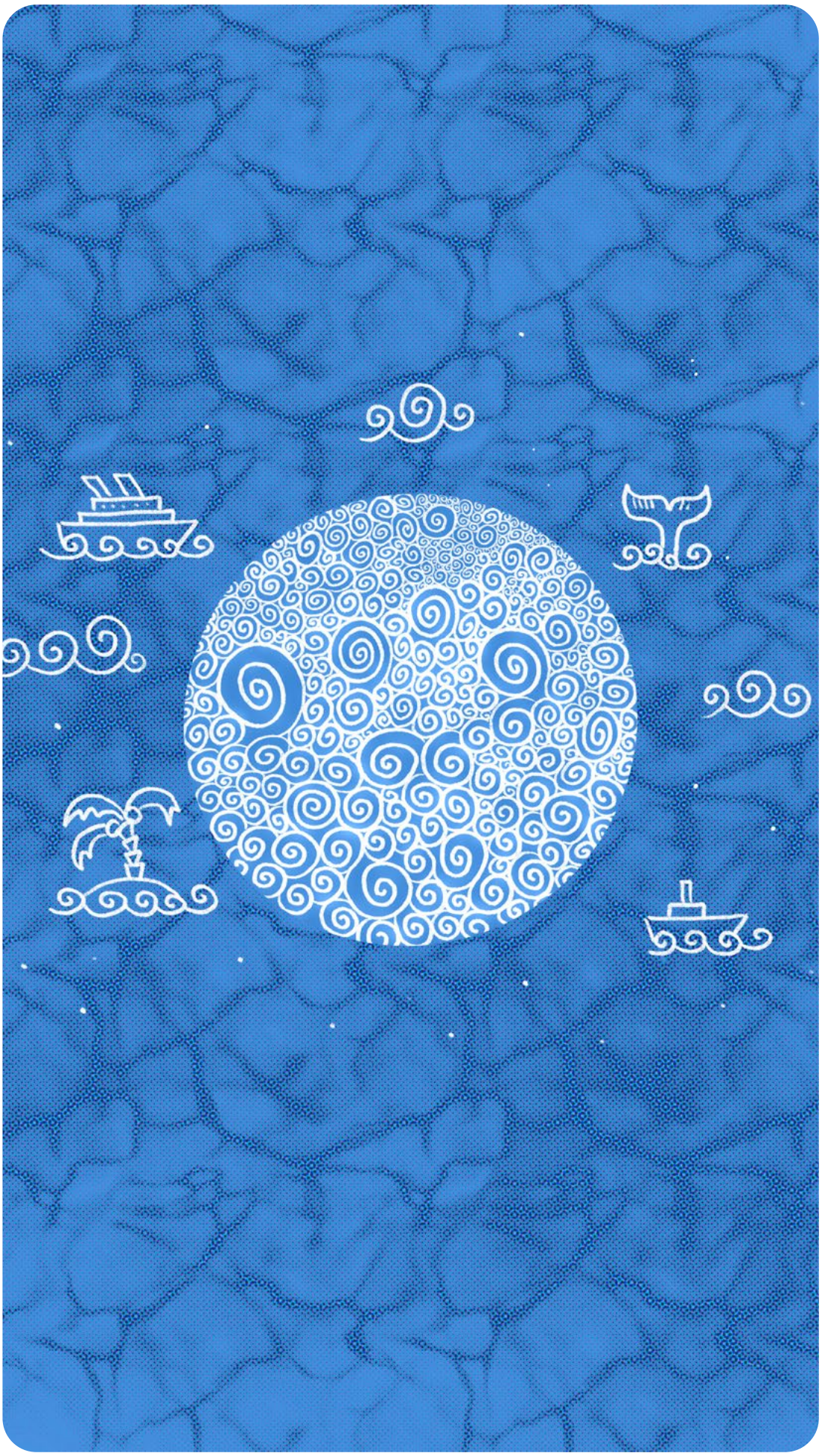
The planet's second lung

While forests are commonly perceived as the planet's primary producers of the oxygen we breathe, we tend to overlook the ocean, a larger producer of oxygen. A large proportion of the oxygen we breathe today was generated by photosynthetic life—microscopic creatures such as phytoplankton and cyanobacteria integral to ocean ecosystems—over millions of years.

"When we think of what we always call the forest, the lungs of the planet, we are forgetting that the second lung is the plankton in the ocean. That's the degree to which we are connected to the ocean. I think starting to draw those connections and feel the ocean closer, whether we live on the coast or we live inland and far away, how touched we are by the ocean is just starting to penetrate at the individual level, but also to the governments and to the decision makers."

– Melania Guerra

Image source:
1. One Ocean View, Image of the ocean from Antarctica



Using tools to shift our perspective

When it comes to understanding the ocean, we have barely scratched the surface. Yet, advances in oceanography are delivering fresh insights into its blue depths across time and space. By leveraging the technology of the Fourth Industrial Revolution (4IR), we now have systems that reveal the wonders of the sea.

Sophisticated tools ranging from sensors and robots, to communication, sonar, and mapping technologies allow us to explore the ocean's incredible beauty, biodiversity, and interconnectedness.

This enhanced capacity to "sense" the ocean is bringing about an important shift in our perspective. We now see the ocean as dynamic, continually interacting with the planet's geochemistry and biosphere, modulating the climate, while shaping the social, cultural, and economic wellbeing of communities around the world.

However, knowing more about the ocean also opens up ways for us to exploit its resources and further degrade marine environments. This double-edged sword presents an ethical dilemma, and encourages us to reflect and act on ways to enhance stewardship of our one ocean.

> **"I've got my robots out in the ocean characterising the ocean structure. And then we're going to see where the sailfish are going, utilising that structure. We're trying to get a handle on their behaviour. It's dangerous, in that it not only gives us the potential to protect, but it gives us the potential to exploit. And that's the delicate balance I think we face as humans in using our tools to either exploit or sustain."**
>
> – Burton Jones

The ocean according to fish

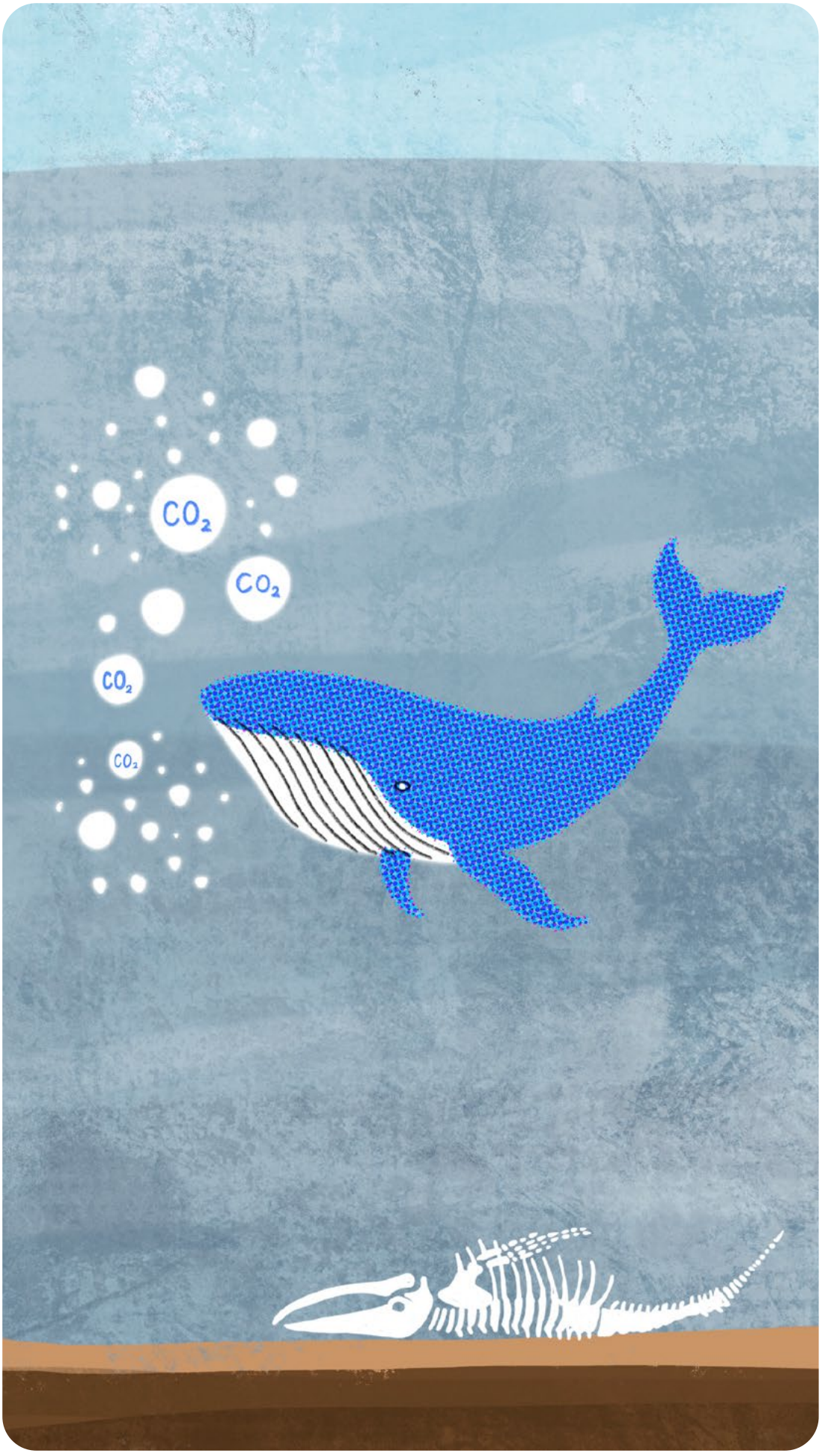
Geopolitical boundaries are meaningless to crustaceans, fish and mammals that move seamlessly across the ocean. Some species traverse thousands of meters vertically, moving from the sunlit surface of the water to the dark depths of the twilight zone in an undulating 24-hour rhythm.

Many other species also migrate thousands of kilometres across vast expanses of the ocean annually. Marine mammals such as the grey whale can migrate more than 22,000 km.

Life in the ocean serve as sentinels to the dramatic changes taking place on the planet as a result of human activity. By tracking marine creatures as they make their daily commute in the largest synchronous migration on earth, or by following the movements of animals across the ocean gives us deeper insights into the rapid transformations that are taking place in the biosphere.

I grew up as a scientist, and my life was dedicated to studying the oceans. I swam with the sea mammals. We studied the cetaceans [group of mammals commonly known as whales, dolphins, and porpoises]. They consider it a single ocean. They move now to South to North, North to South. They stop in the enriched areas of the seamounts to feed their calves. And they dive at 2000 meters deep to find food. The rich parts of the ocean have giant squids and sea turtles that move across the ocean from West to East, or even entering into the Mediterranean and then returning to reproduce in the beaches of Florida spending their youth in the area of the Azures. The ocean is in fact one ocean, and is connected by these creatures from the surface to the bottom of the sea.

– HE Ricardo Santos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> **We're late to this whole issue about the climate oceans nexus and how they're not separate. The oceans and climate are one in many ways. Even though in governance we often have a way of looking at issues through silos or certain perspectives.**
>
> **– Jamie Isbiter**

Ocean life offers solutions to climate change

The ocean is a voracious consumer of CO2, absorbing nearly 10 gigatonnes of carbon out of the atmosphere every year. This helps stabilise the planet's climate, and is indispensable to our planet's survival.

Life in the ocean plays a central role in the capture of carbon. Whales, for instance, can capture and store an average of 33 tons of carbon over the course of their lifespan. Carbon is stored not only in the bodies of whales, but their waste provides rich nutrition for phytoplankton, which captures an estimated 40 percent of all CO2 produced. This is equivalent to the amount of carbon dioxide captured by nearly two trillion trees—four Amazon forests' worth.

When marine creatures die, they sink to the bottom of the ocean, locking that carbon away and removing it from the atmosphere for hundreds of years.

Protecting the ocean through greater stewardship ensures dwindling populations of marine animals can rebound, mitigating climate and environmental challenges we currently face.

"I'm from a developing country, but I have had my career for the majority of it in the United States and in Europe. I have seen this discrepancy and this gap that exists in the resources that my colleagues in Costa Rica have access to. And they are of course, approached to do science because we have this wonderful nature and these wonderful extensions in the ocean. But the amount of human capital that is trained has become really evident in the pandemic, and it is evident that once the researchers couldn't visit and couldn't do their fieldwork for two years, if they had trained the local scientists to do it for them, this huge gap in knowledge wouldn't have existed. We really also need to train people in these countries so that when they show up to the negotiations for treaties and for conventions, they have the knowledge they have the indicators and the metrics about their own ecosystems. And then they can come and negotiate in favour of their own interests."

– Melania Guerra

Inequity in marine research

With the right distribution of knowledge and capacity-building, the Global South can become an equal partner in the exploration and protection of the planet as we collectively face the challenges of this century.

The vast majority of marine research is conducted by the Global North. During the pandemic, research came to a screeching halt, starkly revealing gaps in know-how in the Global South. Had there been ongoing transfer of knowledge and better distribution of expertise, ocean research could have seamlessly continued.

How can we disseminate knowledge more widely, fairly, and equitably so that everyone may benefit from and participate in ocean exploration and discovery?

One solution to resolve the knowledge-gap is to encourage research institutions to collaborate, while taking steps to include indigenous expertise in the protection of marine resources.

"Why don't we grow up knowing that? I mean, a mangrove tree will sequester something like four times more CO2 than a normal terrestrial tree. And yet people think of mangroves as dirty swamps, you know, let's clear them and build an ocean front property. We need to understand the connection that we have and coastal ecosystems are vitally important."

– Jo Ruxton

The OECD estimates that by 2030, ocean-based industries will employ more than 40 million people worldwide by 2030. The fishing industry is expected to account for the majority of those jobs, followed by tourism. The ocean economy is especially important in developing countries, which are home to the vast majority of the 3 billion people who rely on the sea for their survival.

Emerging questions for future conversations

Will seeing the one ocean as a single body of water helps us better value it?

How can governments develop stronger policies that connect ocean and climate action?

How can we fill the knowledge gaps in the ocean sector between the Global Southand North?

How can we disseminate knowledge more widely, fairly, and equitably so that everyone may benefit from and participate in ocean exploration and discovery?

SAFEGUARDING OUR (OTHER) FINAL FRONTIER

We generally think of Space as the final frontier. The deep ocean is the other final frontier: 80 percent is uncharted, and only 7.5 percent is protected. Overfishing, pollution, diminishing biodiversity, and climate change have put immense strain on a system that is already stressed. The use of harmful fishing equipment, bunker fuel from shipping, and the development of new seabed-mining methods will all have a direct impact on climate change. We need to safeguard our ocean from reckless exploitation. There is no Ocean B.

"It's kind of surprising that we know more about space than we do about our ocean. We've explored probably only about five percent of the ocean, mapped. maybe 20 percent of that. Yet we keep sending scientists and astronauts into space to discover more of, rather than, the mysteries of the deep ocean and everything that we have here on our own planet."
Nina Jensen

Climate-ocean nexus

A closer look at the ocean's dynamics has revealed fresh insights into the relationship between the ocean and climate. The ocean absorbs more than 90 percent of excess heat attributed to greenhouse gas emissions.

As carbon dioxide increases in the atmosphere, the ocean becomes warmer and more acidic. Warming and acidification are two separate phenomena, yet they interact in complex ways to harm marine ecosystems.

Rising temperatures cause enormous swaths of coral reefs—the backbone of many ecosystems—to become bleached and to die out. Coral reefs are important to the food web because they serve as breeding grounds for hundreds of species while also offering protection and security for many more.

When coral is harmed with rising temperatures, there is a knock-on effect along the food web all the way to the fish market and our kitchens.

Safeguarding the property of all humankind

The deep ocean, beyond the jurisdiction of any nation, is the property of all humankind. In order to safeguard marine environments and biodiversity with whom we share this planet, effective legal structures are needed.

For these frameworks to be sustainable in the long term, we need to bring to the table diverse perspectives and stakeholders. International organisations, governments, indigenous communities, scientists and lawyers must all have a seat at the table, and must all have an equal voice to secure the future we want.

In the wake of sea freights

International shipping contributes 3 percent of global greenhouse gas emissions annually. And this is expected to rise between 50 to 250 percent by 2050. The pollution generated by ships affects both the air and the water.

Shipping also directly impacts marine life in many ways. Oil spills damage entire ecosystems. Invertebrates and marine mammals, fish and turtles are all are all harmed by ships. Vessel strikes, for example, can cause serious injury or be fatal to marine life—and are a major cause of whale population decline. Chronic ship noise also impairs life under water and affects foraging for food, navigation and migration patterns.

To address these issues, the shipping sector must take collective responsibility, particularly the industry giants, to find cleaner fuels, reduce environmental impact, and find ways to balance global trade while protecting the waters.

"I'm not sure what's happening under the table, so we say, but there are no existing licenses have been issued by the International Seabed Authority, and the nations have been in New York this week, timely enough, negotiating what we're calling the High Seas Treaty. Basically, the closing remarks there were 'we need to remember this is all of humankind's property. It's small states. The developing states, as well as the developed states and the developed states need to take full consideration of developing states'."
Kathleen Swalling

"More than a hundred different countries have ships for shipping industry, but there's thirty-five major players, major countries with a lot of those ships. And that's where it gets complicated because you need rules and regulations and legislations from different countries to try and protect the environment and the ocean. That is one big ocean where everyone else feels like it's a free ground and they can kind of do anything because it's not very regulated."
Katia Nicolet

> **We need to bring in effective legal frameworks. You need to make sure that everybody has a say and an equal say at the table. We need to listen to each other. We need to listen to indigenous knowledge. You know, scientists need to learn from indigenous people. We, as lawyers need to learn from them. I've been fortunate enough to be involved in developing legal frameworks where we co-manage parts of what indigenous people call Sea Country.**
>
> **– Kathleen Swalling**

> **But we also need to remember it's not just us humans here. It's a whole living being. When you go up in space, when you read downstairs in Terra[the Sustainability Pavilion at Expo 2020], the ocean, they have statements from space and the astronauts are saying, 'I looked there and suddenly, it was the most colourful thing that I saw. It was it was full of blue and green, but it was home.'I know I'm not your typical lawyer, as everybody probably has realized, but I think we need to not just take this humanistic point of view when we think about how we create frameworks.**
>
> – Kathleen Swalling

The great hunt

The hunt for rare earth minerals is the gold rush of the 21st century and poses substantial risks to marine environments. Since so much of the world's surface is covered by water, large quantities of rare earth elements, as well as other metals including silver, gold, copper, manganese, cobalt, and zinc can be found at the bottom of the seabed.

As resources on land are depleted, we will mine for minerals in the deep seabed—the next frontier. We can expect ocean exploration to increase exponentially as companies and countries seek out the next big reservoirs of precious materials.

Today, seabed mining for valuable minerals takes place along the coasts of many countries. In the near future, as the demand for these prized resources increases, we can expect nations and companies to mine in the deep sea, well beyond the boundaries of their territorial jurisdictions.

Maritime lawmakers are today working on making the deep-sea bed legally the property of all humankind. Exploitation of the sea bed will lead to new threats to marine ecosystems as well as to the possibility of geopolitical shifts as countries vie for resources that in reality should be part of the commons.

Rare earth elements such as neodymium and yttrium are used in mobile phones, battery storage, electrical vehicles, as well as in solar and wind technology.

Rare Earth Elements are used as components in high technology devices, including smart phones, digital cameras, computer hard disks, fluorescent and light-emitting-diode (LED) lights, flat screen televisions, computer monitors, and electronic displays.

Let's not be in a rush. One of the deepest parts of the Red Sea has very large deposits. And there's been a lot of talk for four years about mining them, and partly the technology isn't there yet, but it's coming. But this particular environment, which is just offshore from Jeddah, is one of the deepest parts of the Red Sea, and is a very unique ecosystem on the planet. The Red Sea is considered a young ocean. It's a spreading rift zone between the African and the Arabian plates. So, geologists are using it to understand how the other oceans develop and evolve. Because it's a rift zone in the water that goes into the crust, draws out the minerals from the crust, and then they come out into the ambient ocean and they precipitate.

We don't fully understand that ecosystem yet. It's a bacterial ecosystem. Planetary astrobiologists are using these ecosystems to understand life on other planets when they go looking for life somewhere else in the universe. What does it look like? They think that these environments are characteristic of it. These are areas people are looking at the organisms because they have enzymes which are not found elsewhere in nature, but potentially have industrial applications. There's also the potential of pharmaceuticals and other things that can be found. So, if we start exploiting these before we understand the other ecological aspects, we have the potential to destroy it before we knew what we had.

– Burton Jones

The Precautionary Principle

The precautionary principle is the idea that we must safeguard things that we do not yet have scientific knowledge about. While we need to prioritise scientific insight into the unknown, first and foremost we need to affirm that we need to protect what we do not know.

As we think about legal frameworks, we could consider them from the perspective that astronauts viewed earth—as a striking, colourful, beautiful sphere that is home. Taking this point of view that the earth is a whole living being, we can create better frameworks for the planet, our ocean and all that resides within.

While the deep sea has abundant reserves of precious minerals, the ocean also has among the world's most distinctive ecosystems filled with resources that we have not discovered yet.

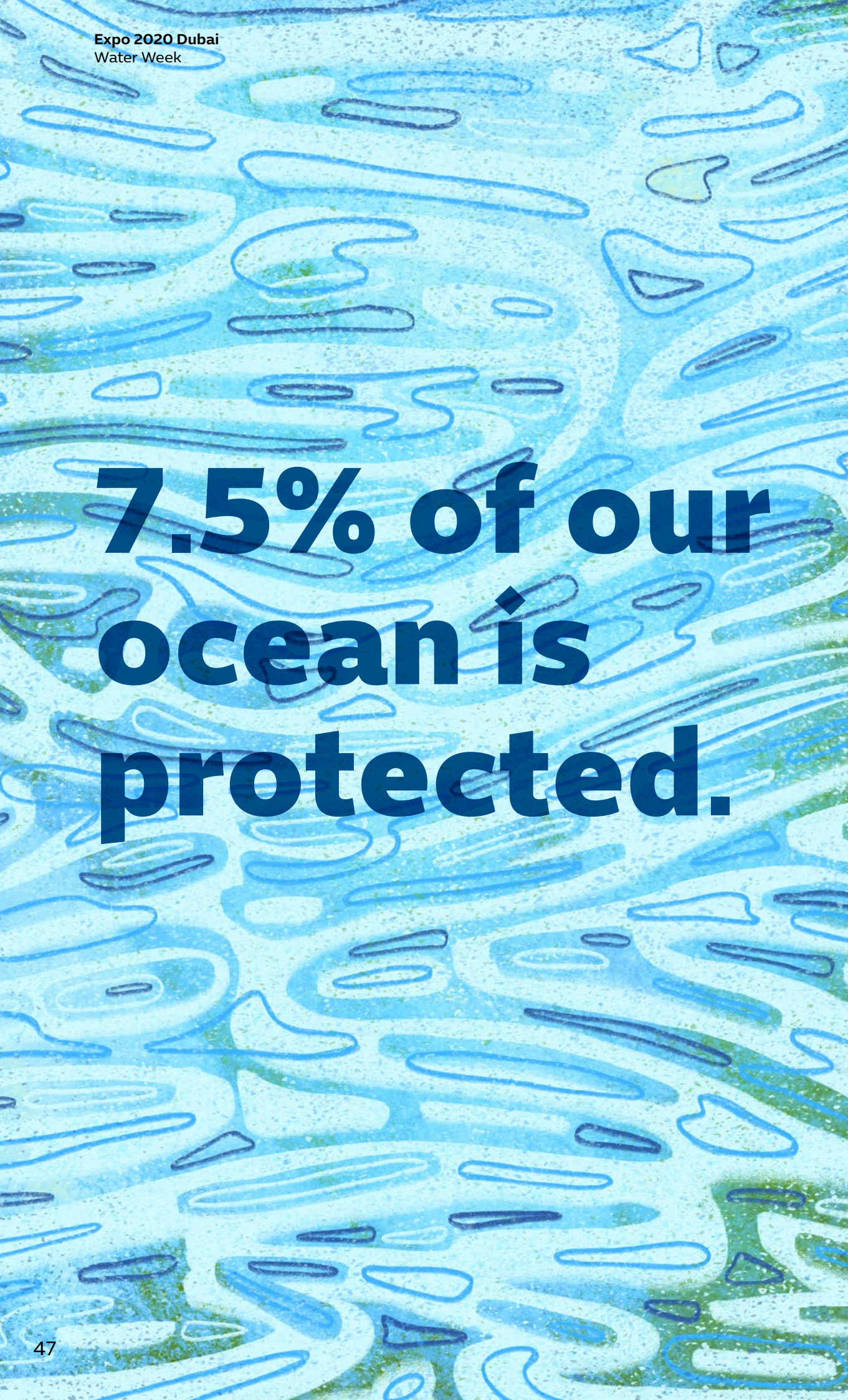
Aside from their importance to life on earth, these ecosystems may provide untold solutions to complex challenges in health, renewable energy, food production, and waste management.

In our rush to exploit and extract the deep sea for resources that we need to support our modern lifestyles and ubiquitous digitisation, we may lose sight of precious resources that can help safeguard the future of the planet. The precautionary principle is a reminder of the critical need to protect our ocean and the life within it.

The connection between space and ocean

Space plays a very important role in sustaining oceans. Observation through satellites is essential to monitor the health of the ocean as well as illegal fishing practices. There are risk that space and oceans have in common as well, specifically in the areas of regulating areas beyond national borders but also ensuring that they do not become the new frontiers of unregulated mining and resource exploitation.

> **The satellite technology and monitoring, coupled with advanced robotics, artificial intelligence and so forth, enables us to much better understand what is actually happening both on the Earth but also in the ocean and the interconnectedness between all of this. So there needs to be a close interplay between the technologies that we're using in space and the ones that we're using down here so to speak.**
>
> – Nina Jensen


7.5% of our ocean is protected.

Conserve and sustainably use the oceans, seas and marine recources for sustainable development.

Accelerating action to protect the ocean

There are a series of significant steps that governments can take in collaboration with industry and other stakeholders to accelerate actions to protect the ocean.

Implement SDG 14 as a policy framework. By leveraging SDG 14, we can conserve and sustainably use the oceans, seas and marine resources as a framework to coordinate policies, governments can take a mission-oriented approach to protecting the ocean.

Valuing the ocean. By developing accounting measures of the ocean's ecosystems and their services, we can better understand the value of water. How can we collectively map the ocean to bring greater transparency and openness on that value?

Carbon market. By investing in carbon market mechanisms, we can incentivise and drive climate action. One area of focus can be blue carbon, which is known to sequester five times as much as land-based systems. How can we use market mechanisms to incentivise value and increase support, particularly for local communities to manage and protect coasts and ocean?

Addressing plastics. By developing regulations, we can begin to manage the plastics that are choking our ocean. How do we create urgency for a treaty so that we can implement the measures and policies necessary to address the challenge posed by the impact of plastics on so many communities?

"The ocean is the most important thing that we have. All life on this planet originated in the ocean. We came from the ocean and the fact that we're treating it as a massive waste dump is so, so surprising to me. And for me, that's also where the space component in part comes in. Because yes, we are doing a lot of exploration in space, but we're also using the ocean as a dumping station or a space graveyard where we are literally disposing of or dumping space waste into this Pacific graveyard. So multiple dimensions connecting space and the ocean. But this one, I find the most frightening."
Nina Jensen

Up to now, we tended to use technology to overcome things. We are now at a place where we need to use the technology, rather than to overcome, to use it to learn how to live in harmony. Going back to what the indigenous peoples used to have to do without all of that. But because we've segregated ourselves and the cities and everything else, we have that physical disconnect. But we need to redevelop that connection and that intimacy with nature. I have hope that we can develop tools that allow us to come back to that intimacy and that understanding of that interdependency.

– Burton Jones

If we think about the discussions around climate change, often they flips to trees, carbon sequestration. Wetlands are being lost 3-4 times the rate that the trees are being felled. So, it's really significant. And those wetlands provide very significant roles in terms of attenuating floods, storing and releasing water, particularly some high mountain environments.

– David Hannah

Protecting fisheries from collapse

Another major step in valuing the ocean is to protect the fisheries from collapsing by creating no-take zones for fisheries. This will be a huge step forward in ensuring the return of fish that have been absent from coral reefs for years.

Using new technologies to safeguard the ocean

Sophisticated integrated ocean sensor systems allow us to monitor activities in the sea in real-time and to use this information to develop detailed management plans. With such systems we can, for instance, determine when and where scuba divers and snorkellers can go diving, so that they do not disturb marine life.

By sensing and visualising the ocean, we can also monitor the negative impact that human activity is inflicting on the planet. At the same time, we can tap into the opportunities offered by the ocean to build a sustainable and secure future.

"The idea is you're putting that into the entire network of managing that community. Scuba diving and snorkelling will be an intimate part of it. But you're going to determine where those divers can go. Maybe if the dugongs or the sea turtles are coming ashore and we don't want them just disturbed, that can be managed. The idea is to develop a very detailed management plan that allows them to regulate the use and activities in the sea."
Burton Jones

Funding to protect the ocean

Among the collaborative international efforts to combat climate change, advanced economies have formally agreed to mobilize $100 billion per year from a variety of sources to address developing countries' urgent mitigation and adaptation needs.

While this figure is significant and will drive innovation for climate change, the amount allocated for oceans falls well below of what is needed.

Indigenous perspectives for safeguarding the ocean

Indigenous communities around the world share a strong affinity with the ocean and the natural world, and have lived in harmony with ocean for hundreds, if not thousands, of years.

As we seek sustainable models for living in harmony and balance with the ocean, we can benefit tremendously by complementing our technologies with know-how from indigenous communities.

We have much to learn from indigenous communities about stewardship of the ocean and our ecosystems, and they may potentially hold the key to re-establishing our links with nature and safeguarding our most precious resource.

"We think about sustainability as a new term. But indigenous communities and many people have managed sustainable practices on land and oceans for thousands of years, and in Australia over 60,000 years. We now increasingly realize how do we bring these two together, how do we use science as a way to really understand value, the risks, the importance of our oceans? But how do we also bring the knowledge and expertise that comes from indigenous communities? If we're going to deal with this global issue, we need to bring these two together in a much more direct way.

How do we bring together science the wisdom and indigenous knowledge that comes from thousands of years of managing and sustainably managing our oceans? How do we bring it together in terms of a way of a national oceans accounting? How do we better value in a broader sense what our oceans value is from a biodiversity, from a blue carbon, from environmental and from a monetary side as well?

Because if you can't value it, then you don't value it. And in doing that, letting that inform the decisions and investments that get made to manage our oceans at a much more sustainable way."

– Jamie Isbiter

Best practice

"I think that's important is to balance both the science and bring stakeholders, and have the conversation at an early stage and take people on that journey. We start to create the awareness for legal frameworks to work. We need people to want to actually voluntarily support them."
Kathleen Swalling

Bringing all the voices to the table to protect the Great Barrier Reef

There has been a highly successful effort to protect and return life to the Great Barrier Reef. Currently, a 33 percent of the area has been designated, up from 4.5 percent previously. The Australian parliament voted overwhelmingly in favour of this. A key reason for this initiative's success is that it recognised, at the outset, the importance of bringing together diverse groups with various interests in the Great Barrier Reef. This included scientists, mining companies, governments, fishing communities and indigenous people. It engaged them along the protection journey as stakeholders, and their various perspectives and interests were woven into and reflected in designing the legal frameworks. As a result, the initiative has had buy-in from the various stakeholders who now implement the protections.

DP World and a Zero Carbon Future

DP World is a leader in maritime trade today. Of the company's total carbon footprint, 70 percent is generated by the marine services division. To address this, a central part of its strategy is sustainability, and DP World is exercising leadership in exploring fuels and technologies that are more sustainable in the long-run. By investing heavily in partnerships for R&D and technology, it seeks to uncover the future of green fuels, and other means to reach a zero-carbon future.

"You have to get the right key stakeholders together. We just joined a partnership with Maersk McKinley and Mueller Centre of Zero Carbon Future for Shipping and is bringing key stakeholders together in regards to what we need to be working on now and again a lot on R&D. What do the supply chain routes need to look like? Where are the future fuels, the green fuels? Where do they have to be located along the supply chain? You know, some very, really critical things. A lot of this isn't going to come about until probably post 2030, 2040, but we got to be working on it right now. It's critical."

– Jason Pratt

DP World's Nature based solutions

While the company is very focussed on technological innovation, it also advocates the need to focus on nature-based solutions, such as mangroves. Mangroves, for example, are key to DP World's Oceans Health Strategy. In 2021, they have completed four projects on mangrove plantations and several on reef restoration.

Portugal—a leader in national-level strategy for the ocean

The ocean has always been central to the Portuguese economy and way of life. The government has taken a mission-oriented, whole-of-government approach to protecting the ocean. Since 2007, Portugal has had a National Ocean Strategy in place, which it has carefully implemented. The strategy uses science as the overarching basis for developing a healthy blue economy based on good governance. The Sustainable Development Goals (SDGs) provide a cohesive, interconnected framework for the national ocean agenda and policies. In order to implement these policies and exercise good governance, scientists and politicians collaborate with the communities they serve.

"In fact, the ocean was until not so long ago thought to be infinite and opaque. There was a lawyer from the 16th century, Hugo Grocious, who said if we exploit the rivers and we exploit the forest, we will have a problem. But nothing will happen to the sea and the ocean. And we have woken up very late. And let me tell you one thing, it's one thing that still puzzles me how the issue of the ocean was away from the Climate Conventions."
HE Ricardo Santos

Emerging questions for future conversations

Are we ready to apply the 'precautionary principle' as we explore new ocean recources?

How do we create urgency to create policies to address the challenges the ocean is facing?

How can we be sure that international policies and regulations are implemented at the local level?

How can indigenous wisdom shape our relationship to the ocean?

Can we accelerate international cooperation on the ocean and align with lessons from space?

How can we incentivise and increase support for local communities to manage and protect coasts and ocean?

VALUING WATER

Ensuring access to water for everyone is one of the greatest challenges ahead of us and could benefit from better understanding of the true economic and social costs of water.

"The better question to ask is 'What's the price of not having water?' Water should not be priced in dollars and cents, rather it must be valued for various dimensions - health, economy, cultural, environmental, and social. Water should be free. But not its services. While nature provides us water for free, someone is pumping it, treating it, distributing it, and also collecting and treating the waste-water produced thereof. Therefore, the costs associated with it needs to be addressed. Governments should take the human rights-based approach to make sure water is affordable and accessible for all."
Abishek Narayan

Today, over 2 billion people do not have access to safe drinking water. By 2030 demand for water is expected to exceed available supply by 40 percent due to population growth, urbanisation and climate change. Already today, 80 percent of the world's population have issues of water security at least one month of the year. At the same time agriculture and manufacturing account for over 70 percent of freshwater usage.

A price tag for water?

We realise that we can no longer take water for granted, and that we need to tackle the challenge of valuing water. While all countries agree that water has a value, there is little agreement on a price tag.

Part of the complexity around setting a price for water is that it is wrapped up in multiple layers of value and meaning: Water is life-giving, and has social, economic and ritualistic value, while in the case of industry, it has commercial value.

In addition to the social, emotional and political perceptions and costs of water, there is also the price to purify water, clean it, transport it, use it and treat its waste, and either recycle it back again or put it back out at sea.

In addition, the social, emotional and political perceptions of water contribute to its value. We must consider the cost to purify water, clean it, transport it, use it and treat its waste, and either recycle it back again or put it back into the sea.

"Water is important, and it's important in different ways to different people and different geographies. Water in, say the Scandinavian countries versus water in the Middle East versus water somewhere in the Amazon Forest, it's all got different costs associated with it. Some of them are emotional, some of them are political and some of them are direct. Finally, there is a real price of water and that the price of water is basically to take water, purify it, clean it, transport it, use it and then transport the waste and treat the waste and, and either recycle it back again or put it back out at sea, depending on, again, where you are."

– Samer Aljishi

Adam Smith posed a conundrum 250 years ago that we continue to face today: water is necessary for life, and diamonds are merely ornamental. Yet, we are willing to spend vast sums of money on beautiful rocks while we take water for granted.

Processing water is a technology-intensive activity and uses enormous amounts of energy. These hidden costs, in turn have fossil fuel costs, resulting in environmental costs due to carbon emissions and other impacts on ecosystems.

Will the current climate crisis open the door for world governments to change the narrative around the value of water?

"Although we call it wastewater and we prefix it with waste, it really is a resource. Farmers see 'wastewater' as a valuable resource and there are now several examples small treatment plants being built near fields."
Abishek Narayan

Water to grow food

Agricultural water accounts for 70 percent of all water used globally, making it the most water-intensive industry. Countries are unable to have the returns from the cost of operation, maintenance, and construction associated with providing agricultural water. In many countries, farmers are consuming a large volume of heavily subsidised water. Removing such subsidies would raise a slew of political and societal issues. One sustainable solution can be derived from creating closed loop water systems that integrates waste water into food production.

Water has a gender impact

The statistics around water are staggering. Two billion people—mostly women and young girls—spend an estimated 125 million hours per day just collecting water.

40 billion hours per year are spent collecting water in Sub-Saharan Africa alone, equivalent to a year's worth of labour by the entire workforce of France.

When we talk about drinking water, we can all agree that it has value, cultural value and has emotional value, but we tend to think of water as drinking water and wastewater and storm water and groundwater, and then we don't value all of that water the same. If we thought about it all as one water, we would.

– Susan Moisio

When there isn't enough water on site and it needs to be collected. This is generally done by women and girls, and they pay a colossal the price in terms of time and missed opportunities. Every day, women and girls around the world spend more than 200 million hours gathering water.

Source:
UNICEF (2016)

> **There is no scarcity of water, only scarcity of management.**
>
> **– Asit Biswas**

"Water resource management is a lot more than just the technical and innovation side of things. And it is really deeply involved in changing people's behaviours and their attitudes towards the value of water."
Abishek Narayan

Scarcity of water or scarcity of management?

Some argue that the world does not have a water crisis—rather, there is a water management crisis. Globally, water is being used by agriculture (70 percent), industry (20 percent) and people (10 percent).

Good management systems are needed to balance these different demands. It is critical to manage supplies sustainably and holistically and focus on water security to address concerns such as too much water, too little water, and water that is too polluted, especially in light of climate change and urbanisation.

Arid places can have enough water if carefully managed. On the flip side, areas with sufficient water can also suffer water stress and shortages. For instance, in the developed world as much as 40 percent of water is lost before it reaches home because infrastructure leaks and evaporation.

Bringing water closer to users is a challenge-unlock

We are in the middle of a paradigm shift in which water and wastewater services are becoming more modular and decentralised. This means recovering resources such as water, energy, nutrients closer to the point of consumption, integrating services and meaningfully involving the private sector is becoming increasingly more feasible. Decentralised, integrated technologies enable our water systems to become more circular, with immense social, economic and environmental benefits.

The transmission of water, like transmission of electricity is a major challenge, and currently many people in rural areas do not have access because centralised systems often do not reach them. Large centralised infrastructure needs a lot of money to build, and a significant amount of energy to sustain. With centralised water distribution systems, rural communities tend to be left out because water tends not to reach them. And if it does, the quality and quantity of water is frequently unreliable.

> **If we're staying within the paradigm, how can we shift paradigms?**
>
> **– Jamila Bargach**

One way to address water scarcity is to decentralise infrastructure, bringing the water source closer to where it is being used. Decentralised systems are also more efficient, and simpler to operate and maintain. And it is easier to address water losses near the point of consumption.

Smaller, decentralised supply systems can be a challenge-unlock for bringing safe drinking water to people where centralized systems fails. Bringing water closer to the communities can lead to significant improvements in public health by making water both available and safe to consume.

Bringing water and waste treatment closer to the home or community typically increases people's trust in water because they know the water is coming from their own homes or towns and being treated in their own backyard.

"I don't think anybody lives in a place where they don't have any water because they would die. When you don't have water, it forces migration to locations which have water ultimately. And that's another issue. That brings us again to the need to provide off grid systems so that you can take people and you can maintain that diversity instead of everybody moving to the city where maybe there is a centralised system that you can provide water at the community level."
Samer Aljishi

Education and water literacy

Educational materials are instrumental in understanding our role in the environment. We need to think about how we represent the water cycle and understand that people are really a key part of it.

A recent analysis looked at 450 diagrams of the water cycle. It found that only 15 percent of these featured people. Only 2 percent represented anything to do with climate change. Only 2 percent had showed pollution in water.

These diagrams were giving the impression that there is much more fresh water available, but also that human activity is completely disconnected from the water cycle.

"So, it gives us an impression of the water cycle diagrams that our kids draw at school of there being much more available fresh water than there is indeed many of those water cycle diagrams. They don't even have the terrestrial land mass on them."
David Hannah

> **I think there is a big potential in creativity really linking knowledge and forms of expression in finding new solutions. And I think in the end, we probably will have to radically change our education because we need a new resilience and we will certainly need new skills. There is big potential to start very early. What does the world need? We need an embodied knowledge. And ways to find expression in this crisis to change it into something positive?**
>
> **– Irène Hediger**

"And I think the one thing that I would like to see is ocean science. Coming into general school education. All children can tell you that the oxygen that we breathe comes from forests. Nobody taught me that more than half of it comes from the ocean. And I think if we grow up knowing that the ocean is our life support system, I think we would respect it more and we would want to keep it healthy for the sake of everything that lives on the planet, not just something to receive our effluent and our waste, and something to just take everything out of it."
Jo Ruxton

Water migration
When people do not have water, they are forced to migrate to locations where they can find it. Often, this means a flight from rural to urban areas. Lack of water in some countries is moving people more than war.

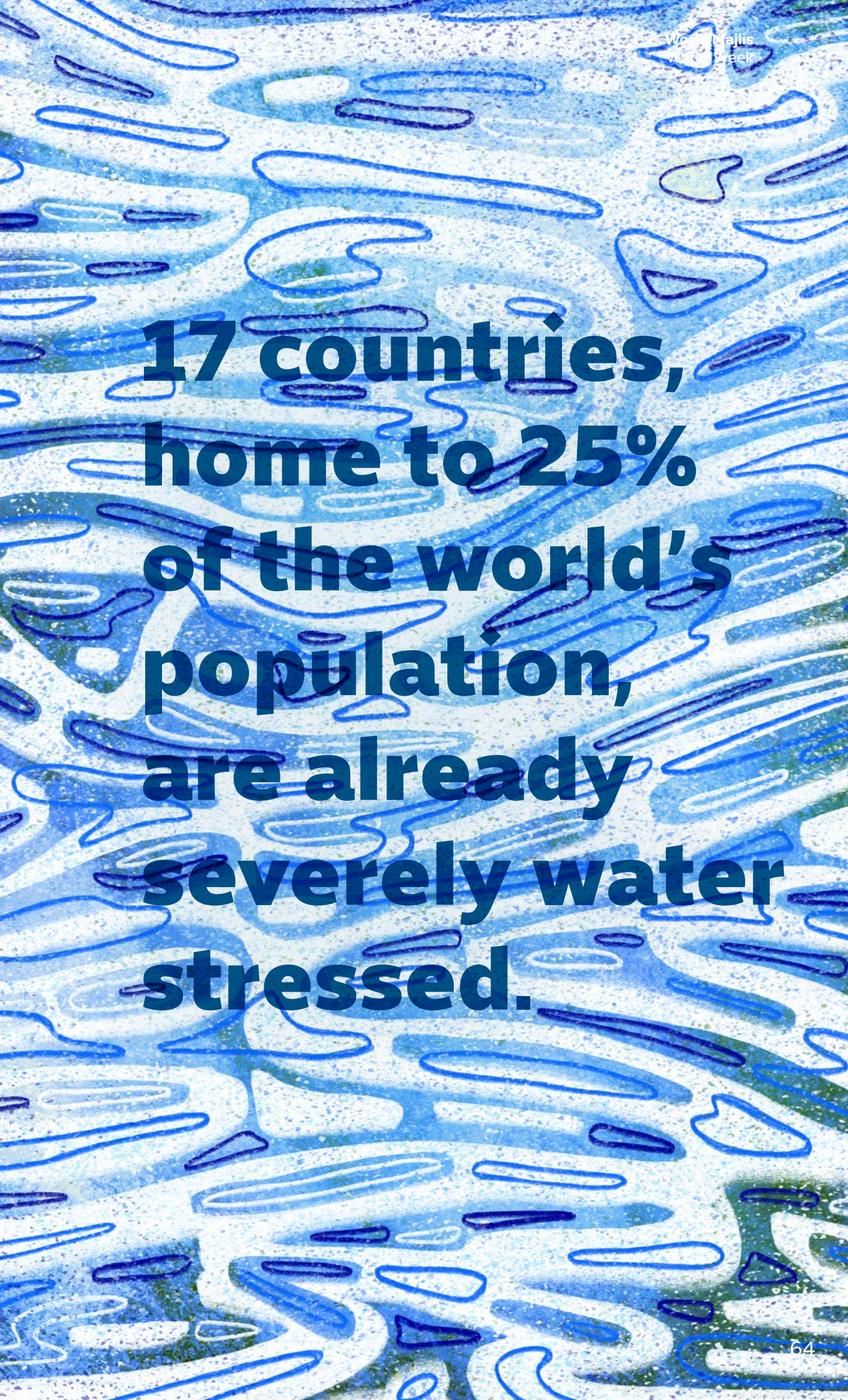
Usually less affluent workers tend to migrate with ramifications for both migrants and receiving countries. Even though the majority of water migrants end up in cities, they are nonetheless plagued by water scarcity.

Providing off grid systems so that people can reliably get water where they live may be a solution to this challenge.

Droughts will affect 700 million people by the end of the century.

Middle East and North Africa (MENA), where 60% of the population lives in water-stressed areas, and water is noted as one of the region's main vulnerabilities, particularly for refugees and host communities.

As climate change accelerates and increases water uncertainty, there will be an increase in "day-zero" events – when taps run dry – in cities, which now house 55 per cent of the global population.


17 countries, home to 25% of the world's population, are already severely water stressed.

23% of adolescent girls in India drop out of school due to lack of sanitation in schools.

Private sector helping leapfrog decentralisation technologies

Developing new technologies that improve water access and treatment is an opportunity for the private sector to collaborate with government to ensure that there is water for everyone.

Advances and innovations in decentralised systems may allow countries to leapfrog their way to universal access. This presents private sector with opportunities develop the market for decentralised and circular water systems, especially when municipal funding is limited.

There are already good technology options available from the private sector. However, technologies will fail unless they are supported by an enabling ecosystem that includes financing, operations and maintenance, legislation and regulations, as well as behaviour and demand models.

In addition, there is an important role to be played by education institutions in fostering the next generation of water experts. And for industry to collaborate with academia to foster innovations.

"There must be technological solutions in order to treat water in order to clean water, transport water, and, and that has to be undertaken. And there are not enough people working in the field."
Samer Aljishi

"More diverse systems are more resilient to change. If we move to monoculture environments, we tend to get one response to one outcome, whereas more diverse ecosystems, give us a variety of outcomes. As our climate changes, as we have greater human impact on the environment, if we tune out that diversity, we tune out the options."

– David Hannah

Access to safe, affordable and reliable drinking water and sanitation services are basic human rights. They are indispensable to sustaining healthy livelihoods and maintaining people's dignity. Human rights to water and sanitation are essential for eradicating poverty, building peaceful and prosperous societies, and ensuring that 'no one is left behind' on the road towards sustainable development. Access to safe drinking water can make a significant difference in people's lives.

Source:
United Nations

"Conservation absolutely has to be part of the conversation. And this is where I think trick between value and pricing becomes difficult. What cost do we put on biodiversity? Freshwater biodiversity has had the greatest decline of any system, 83% loss of species that we were aware of previously."

– David Hannah

"Everybody talks about energy; I think because there's a cost of energy and there's a known carbon footprint from energy. The support for water initiatives does not exist because water is not a commodity, but it varies depending on where you are in the world. Creating that level of importance and dialogue for it at international level and then national levels is going to be a key driver toward solving the problem and supporting technology growth in this area. So, I think that dialogue needs to come in."

– Samer Aljishi

"It's what you give back. And what are you going to do about the future? In Hawaii, everything they do, they think about how it's going to affect seven generations beyond their own, not the time that you're a politician or your time on this earth. We need to be responsible for that for the generations that are going to follow."
Jo Ruxton

Water for everyone

Most of the challenges around drinking water and sanitation are concentrated in the developing world. However, the developed world is not immune, with the poorest households and remote communities bearing the brunt of water scarcity. Providing safe water, more than any other single policy, is more likely to have a large impact on global poverty.

This becomes more pressing as climate change, growing populations and increasing water use for food production are exacerbating the stresses on water systems across the world. Water governance in all countries will have to change significantly if we are aiming for universal access to water and sanitation now and in the future.

Addressing the challenges of our oceans, drinking water and sanitation will require major shifts in water governance. A seat at the table for stakeholders including agriculture, trade, energy, environment, and industry, as well as scientists, research institutions, lawyers and the public will be key in a coordinated way forward.

But governance alone will not solve the challenges. Raising awareness among the public, and public action in turn, can be major catalysts for change. Our survival depends on water. With the mindset that we are all stakeholders, and that we can all play a role in its stewardship are key to ensuring a future where there is water for all.

> **Personally, I find the concept of the Anthropocene to be liberating because if we acknowledge that humans are the largest geologic force on the planet, it makes the issue of our relationship with the planet a kind of imaginable whole. That's critical toward addressing any of these issues because it helps to bring together a mindset that says you, it's not a game of whack a mole. This is really about gathering all of these resources and really focusing on what's going to create a more productive relationship with the planet, which doesn't mean that you don't choose priorities, but you maintain a view of the context. If we can get large numbers of people to think in those terms, it also helps governments and industry and others whose actions are essential, to take those actions and to lean into it rather than resisting it.**
>
> – Tom Hennes

Best practice

People against single-use plastics

In many countries, not just developing countries like Malaysia, solid waste disposal is a major problem. In large cities like London and New York there is plenty of evidence of this every day mountains of single-use plastic garbage pile up. During the rainy season, single-use plastics are washed down into the drainage systems and end up in the marine environment.

An initiative at Malaysia's Ministry of Environment and Water is tackling single-use plastics: Staff are urged to quit using single-use plastics by providing them sustainable, reusable food containers and raising awareness of the dangers of single-use plastics. Even the best regulatory structures are undermined by inaction. People can also be catalysts for change.

> *"We give them proper food packaging and I will be watching around and then talking to people, 'why are you still using single plastic?' Unless we show that we fought, that single plastic is not sustainable and we can have better replacements, people will not change. The point is this, we need people to lead the movement, the transition, the transformation. We cannot just put in place a very nice regulatory framework for people to follow. I think it must matter if people like me."*
>
> – Zaini Ujang

Harvesting fog

Morocco's indigenous people have a deep appreciation for water and have learned to harvest it in a sustainable manner. The technologies for harvesting water from fog are central to the identity of the Amazigh communities in southwest Morocco, but it is not unique to that region. It is a very old and ancient technique that has been documented in the Canary Islands in the 15th century, and existed in Namibia. It can also be found in Peru and other places where there is a lot of fog. In collaboration with our German partners, the Water Foundation, our organization has built and is running the world's largest fog collection initiative.

The initiative has a storage capacity of nearly 1000 cubic meters. The harvested water is distributed to communities in exchange for a very small, symbolic sum of money. There is no other source of water because droughts occur frequently, there is a lack of rain and wells have dried up. This is a small solution for a small group of people. But the concept, impact, and possibilities have paved the way to provide us with important lessons.

"The fog goes through the nets, we collect it, and it has a lot of beauty to it. And I usually love to speak about my love for fog and the beauty of fog, and then we gather it in containers, large containers in the organization."
Jamila Bargach

Innovative grassroots solutions by youth

Swiss Water Partnership Youth is we're giving very small seed grants to young people doing projects all across the world. For example, a 17-year-old girl loading educational water content on used iPads and, after refurbishing, sending the to Sierra Leone to teach young children innovative solutions around water.

"I think young people are a big part of the solution to this, this complex water puzzle we're having and rightly so because very soon we're the ones who are going to be dealing with the problem. Young people are already playing a crucial role in the water sector. Just like conversations being catalysed in the climate sector, action is already being catalysed by young people in the water sector. Great work is being done by youth at the grassroots worldwide. It is essential to include them in the conversations."

– Abishek Narayan

Best practice

"There are a lot of rules that don't allow you to take water and clean it to drinking water quality. There are no real international regulations that allow you to do that yet on off grid smaller system. So that's something that we as a community will need to develop moving forward."
Samer Aljishi

Private sector off-grid solutions

A company called BFG in Bahrain is looking to develop technologies to provide a closed system to purify water using off grid solar energy. These systems utilise very little power in order to clean water at the source and purifying the water to any desired level of quality.

There are a number of innovations today that can take back black water, clean it at the source to a level that very close to drinking water quality. Similarly, there are technologies that can take grey water, such as hand wash stations, and recycle it again for hand wash—resulting in a completely closed system. Such systems also resolve challenges around transporting water to where it is needed.

The company is also looking at using uses off grid energy such as solar energy to power its systems.

"You need to embed it in the youth so they grow up with that new mentality. You need to get the universities to look for new ideas."
HE Ilya Espino De Marotta

Engaging universities in raising water awareness

In Panama, water used to be taken for granted. However, rainfall patterns have shifted, forcing Panamanians to reconsider their water attitudes. Joint agreements with universities have been established to engage them in the process of creating innovations and providing training to raise awareness of importance of water conservation in the country. As part of the arrangement, universities teach younger students how to water more efficiently and sustainably.

Artists and scientists collaborating towards global solutions

Artists-in-labs, Zurich University of the Arts (Zürcher Hochschule der Künste), brings together artists and scientists from around the world in long-term collaborations to think about and address global scientific challenges creatively. Among the issues that artists and scientists are tackling is the future of water by learning from water issues in different contexts and geographies.

"For me, it is really interesting about this art science interaction is bringing artists to connect with scientists that are really researching in this field, but also artists having their own experience, materiality and also coming from different place. Having this exchange to understand the global systems of water and different waters in Switzerland—it's more solid water in glaciers there—and you see them just melting away. So, we have this exchange between scientists and artists from different countries that we get an understanding of the local and regional challenges to think about solutions for the future."

Irène Hediger

> **Water is the climate connector. So, we need to involve it in our nexus thinking about food, water, energy. Think about it like carbon. I think what we really need is a bit of a paradigm shift from where we are in previous COPs. We think about water as being an impact and at the end and it's discussed in the context of damage and loss and payment for it, that for me is wrong headed, what we need to do is turn the narrative around and think about how do we adapt, how do we mitigate, not how do we pay for the damage? Yeah, we need to think about it that way around. We need a different way of thinking.**
>
> – David Hannah

Emerging questions for future conversations

How can water accounting and that of other natural resources be implemented?

Can decentralised water provision in rural communities be a solution for preventing flight to urban areas?

What is the role of universities to spearhead new areas of research and innovation?

Are companies across all sectors willing to rethink their business models in favour of water stewardship?