



China Dialogue
Ocean

October 2023

Blue frontiers



**Solutions to the crises
facing the ocean**

INTRODUCTION

Although the ocean covers about 70% of the Earth's surface and produces about half of the oxygen we breathe, it has long been “out of sight, out of mind” for environmental policymakers.

Of the 17 United Nations sustainable development goals, the one on the ocean is by far the least funded. Yet crises including plastic pollution and overfishing threaten to overwhelm many of the ocean's lifeforms.

Thankfully, in recent years, the ocean has finally arrived at a more distinguished position at international talks. The year 2022 marked an “ocean super year”, as countries pledged landmark commitments to address the crises, including an agreement to develop [the first legally binding treaty to end plastic pollution](#).

The super year finished strongly with the historic [Kunming-Montreal Global Biodiversity Framework](#) agreed at the COP15 UN Biodiversity Conference in Montreal, Canada. This agreement includes goals to halt and reverse global biodiversity loss by 2030 and protect 30% of the ocean and 30% of land by the same year. Currently, only around 7% of the ocean is under some level of protection.

As the president of COP15, China was recognised for its leadership in bridging divisions and its effective partnership with Canada. The country has also continued to scale up

biodiversity protection efforts at home. These include completing the drawing of its [ecological conservation redlines](#), announced by the Ministry of Natural Resources in April 2023. The redlines policy aims to enforce better protection of ecologically significant areas, including wetlands and coastal waters.

Carrying on the momentum from last year, the international community has delivered more breakthroughs in ocean protection in 2023. In March, after nearly two decades of negotiations, UN members sealed an agreement to protect marine life on the high seas. This high seas treaty, also known as the BBNJ treaty, lays the framework for countries to establish new marine protected areas outside national boundaries.

While the world scrambles to tackle climate change, a resilient ocean will be instrumental, given the intricate interconnection between climate and ocean. Research shows that ocean-based climate actions can deliver up to 35% of the annual emission cuts needed in 2050 to keep global warming within the Paris Agreement's 1.5C warming limit.

[Cutting emissions](#) from the global shipping industry, which contributes over 1 billion tonnes of CO₂ annually and about 3% of global emissions, is one such action. In July, nations at the International Maritime Organization committed



to [stricter climate targets](#) that would bring the sector to net-zero “by or around” 2050. Although campaigners said the plan failed to align with the 1.5C target, they vowed to push for higher ambition while the organisation negotiates measures to achieve the goals.

Meanwhile, some mining companies are itching to tap into critical minerals in the deep sea, arguing that it will deliver metals for the renewable energy transition in a less environmentally damaging way than land-based mining. However, many marine biologists disagree, warning that scooping up metals from the seabed could damage the habitats of marine life through direct destruction and sediment plumes.

An increasing number of countries also [urge caution](#) over allowing the activities while current science knows very little about the impacts. In July, Portugal, Finland, Brazil and Canada joined another 16 states in calling for a ban, moratorium or precautionary pause on deep-sea mining.

In their July meeting, the members of the International Seabed Authority, the UN-affiliated seabed regulator, delayed finalising the regulation that would cover deep-sea mining. Now they intend to finish it by 2025. The decision effectively denied an immediate green light for companies to begin mining.

Beyond the international talks, scientists have been exploring new frontiers to tackle climate change with the help of the ocean. One of these is artificially increasing the ocean’s carbon absorption and storage. However, most [ocean-based CO₂ removal measures](#) are untested and controversial. Other marine scientists are developing new ways to support ocean-based climate efforts, such as by using [insurance to fund coral restoration](#) after extreme weather events.

Ocean advocates hope the momentous progress continues at the COP28 UN climate conference, convening from 30 November to 12 December in Dubai. They call for increased finance for ocean-based climate measures and better inclusion of them in national climate action plans.

The articles featured in this report offer deep dives into, and essential scrutiny of, the ocean journey described above. We hope our storytelling can bring seemingly distant ocean issues closer to our readers, spark meaningful conversations and contribute to changes.

Regina Lam
Special projects assistant editor, China Dialogue



**Dedicated to
illuminating, analysing
and helping to resolve
our ocean crisis.**

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A Sumatran rhinoceros and her newborn calf. There is disagreement among experts on whether the COP15 deal will be enough to reverse global nature loss. (Image: Stephen Belcher / Alamy)

BIODIVERSITY

COP15 reaches historic agreement to protect biodiversity

An agreement has been reached to protect 30% of the planet's land and 30% of its ocean by 2030, among a host of new targets

Fermin Koop, Regina Lam, Xia Zhijian
December 21, 2022

Delegates at the COP15 UN Biodiversity Conference have approved a deal to halt and reverse biodiversity loss by 2030, hoping to put nature on a path to recovery for the benefit of all the world's people.

The Kunming-Montreal Global Biodiversity Framework was agreed after two weeks of tense negotiations in Montreal.

Its significance has been compared

by many to the 2015 Paris Agreement on climate change, and comes as biodiversity declines at the fastest rate since the extinction of the dinosaurs 65 million years ago. Scientists estimated in 2019 that a million plant and animal species are at risk of extinction, with changes in land and sea use, climate change and pollution among the main drivers.

The chair of COP15, Huang Runqiu, China's environment minister, declared the framework adopted at a late-night plenary session on 19

December. Despite being hosted in Canada, China was president, as the conference had been scheduled to take place there in 2020. However, after delays due to Covid-19, the final session was eventually moved to Montreal.

In a last-minute twist, the Democratic Republic of the Congo refused to agree to the framework, telling the plenary it couldn't support it as it didn't guarantee sufficient funding. However, moments later, Huang Runqiu said the framework

was finished and agreed, triggering a round of applause from most of the delegates.

“It’s a historic step in the history of nature conservation,” said Peng Kui of the Global Environment Institute (GEI), a Chinese non-profit. “These key targets reached a subtle balance and created the conditions for the passing of the framework.” He added they could be started immediately.

Steven Guilbeault, Canada’s minister of environment and climate change, said that while most countries wanted more things in the text, they had managed to create an “ambitious” package.

“We have an agreement to halt and reverse biodiversity loss, to work on restoration, to reduce the use of pesticides. This is tremendous progress,” he added.

The 30 by 30 target

Overall, the global biodiversity framework includes 23 environmental targets to be delivered by 2030 and four less-specific goals to be met by 2050. The most prominent target – known as 30×30 – is for 30% of land and ocean to be protected. About 17% of the planet’s land and 8% of its ocean is currently protected, meaning activities such as farming and fishing are restricted. The agreement is not legally binding.

This target had been pushed by two main groups long ahead of COP15. The High-Ambition Coalition (HAC), launched in 2021 and now with 116 signatories, has sought to preserve both 30% of the land and the ocean, while the UK-led Global Ocean Alliance (GOA), with 73 members and over 130 supporting nations, has focussed on the 30% ocean target.

Franz Tattenbach Capra, Costa Rica’s environment minister, said: “We have protected our land, grown our forests and still become a productive country. We haven’t sacrificed nature for our productivity in agriculture as we are using new techniques and friendly agriculture methods. You can do it without sacrificing nature.”

The framework’s target specifies



The endangered Java sparrow (Image: Komkrit Tonusin / Alamy)

the conservation of at least 30% of coastal and marine areas, alongside 30% of land. Countries that have high ocean protection ambitions demanded the change be made to an earlier draft, which only pledged to protect 30% of land and ocean together.

Steve Widdicombe, director of science for Plymouth marine laboratory in the UK, said he is delighted to see the target has reflected the distinctive needs of ocean and land, and how both “equally needed to be protected.”

The inclusion of ocean acidification as a driver of biodiversity loss in the framework is also seen as a win for the ocean community, which has started to promote synergies between ocean health and biodiversity. The text calls for measures to increase the resilience of the ocean, including climate change mitigation, adaptation and disaster-risk reduction.

Countries also agreed to identify by 2025 and “eliminate, phase out or reform” subsidies that are harmful to biodiversity, while “substantially and progressively reducing them” by at least US\$500 billion per year by 2030. Each year, the world spends at least US\$1.8 trillion on harmful subsidies, according to a report by Business for Nature.

Indigenous communities and human rights

Indigenous groups praised the global biodiversity framework, especially the 30×30 target, for recognising the rights of indigenous people and local communities in strong language and at an unprecedented scale for a conservation plan. It upholds the rights to sustainable use of nature where that use “is fully consistent with conservation outcomes.”

Jennifer Corpuz, a representative of the International Indigenous Forum on Biodiversity, said: “It’s historic. It’s a moment to celebrate.”

A member of the Kankanaey-Igorot people of the northern Philippines, Corpuz said the recognition of indigenous rights under the 30×30 target has addressed “the experience that indigenous people have in relation to forestry conservation”. It offers them “enough basis” to work with government and to influence national policies, she added.

Some conservation models, including “fortress conservation”, have a record of denying indigenous people rights to practise their traditional ways of life – such as hunting, fishing and gathering herbs for medicine – and of



Jennifer Corpuz of the International Indigenous Forum on Biodiversity (Regina Lam / China Dialogue)

displacing them from ancestral lands.

Over the past four years of the negotiations on the framework, representatives of indigenous communities have campaigned strongly for a rights-based approach, which means ensuring conservation is not in conflict with human rights, but improves their realisation.

Indigenous groups had a huge presence at the side events and panels of the conference. Dallas Smith, the president of Nanwakolas Council, which comprised six First Nations communities in the province of British Columbia, said he had witnessed a significant improvement in indigenous representation since he first spoke at the UN millennium ecosystem assessment in 2005.

Gender and health

The agreement includes several mentions of the role of women in protecting biodiversity. A successful implementation will depend on ensuring gender equality and empowering women and girls, the text reads. It also calls for gender-responsive representation and participation in the decisions taken following the agreement.

“It’s a significant step forward towards rights-based, gender-just and socially equitable biodiversity conservation,” a statement from the Global Forest Coalition reads.

Women in various parts of the global south rely on biodiversity for their livelihoods, and to contribute to the overall wellbeing of their families and wider communities. In Africa, rural women are the main food producers and caregivers, accounting for 70% of the continent’s agricultural workforce, according to a report by Oxfam.

There are also several references in the text to the interlinkages between biodiversity and health. The agreement will have to be implemented with consideration of the World Health Organization’s One Health Approach, which seeks to sustainably balance and optimise the health of people, animals and ecosystems.

At the same time, countries will have to ensure that the use, harvesting and trade of wild species is sustainable, safe and legal, preventing overexploitation and reducing the risk of pathogen spillover – one of the possible reasons behind the Covid-19 pandemic.

Financing biodiversity conservation

The agreement calls for the raising of US\$200 billion by 2030 for biodiversity, from a wide range of sources. It calls for an increase to at least US\$20 billion annually by 2025 of the money that goes to developing countries, which should then increase to US\$30 billion by 2030.

During COP15, individual countries also committed to increase levels of funding, including France, which will double its international finance for biodiversity, reaching over US\$1 billion

per year by 2025, and Canada, committing C\$350 million (US\$257 million).

A recent assessment by the UN Environment Programme estimated that investments into protecting and better managing nature need to double from current levels, reaching US\$384 billion per year by 2025. Early draft versions of the framework called for closing a \$700 billion annual gap in financing by 2030.

African countries wanted to create a new fund for biodiversity but finally agreed to create one under the UN’s pre-existing Global Environment Facility (GEF). This is the best way to get something “immediate and efficient” said Christophe Béchu, France’s minister for ecological transition, claiming a new fund would delay allocating the funds.

The global south has most of the planet’s biodiversity but lacks the financial resources to restore ecosystems, reform agriculture, fisheries and forestry practices, and conserve threatened species. Latin America has experienced the greatest regional decline in average wildlife population abundance, at 94% between 1970 and 2018, according to a WWF report.

The agreement also calls for the “fundamental transformation” of the global financial system and for the reform of multilateral development banks and international finance institutions, as the COP27 climate agreement did. But there’s no mention of debt-for-nature swaps despite requests from some countries such as Colombia.

“Just with 10% of what we pay in debt per year we could meet our climate and



Just with 10% of what we pay in debt per year, we could meet our climate and biodiversity targets

Susana Muhamad
Colombia’s environment minister

biodiversity targets,” Susana Muhamad, Colombia’s environment minister, told the summit’s plenary session.

Loopholes in the text

While largely celebrating the agreement, some environmental groups such as the Wildlife Conservation Society (WCS) said they were concerned that the deal puts off until 2050 a goal of preventing the extinction of species, maintaining the genetic diversity within populations and preserving the integrity of ecosystems.

“The global biodiversity framework is a compromise, and although it has several good and hard-fought elements, it could have gone further to truly transform our relationship with nature and stop our destruction of ecosystems, habitats and species,” said Susan Lieberman, vice president of international policy at the WCS.

NGOs also wanted stronger language around subsidies and questioned the lack of a numerical target on reducing human consumption and production, key drivers of biodiversity loss. Greenpeace was especially critical, claiming that the agreed funding isn’t enough and that the 30×30 target fails to ban certain damaging activities from protected areas.

“Taken altogether, COP15 failed to deliver the ambition, tools or finance necessary to stop mass extinction,” An Lambrechts, head of the Greenpeace delegation, said.

Campaign group Avaaz said 50% of land and ocean should have been protected in the framework if parties want to reverse, and not simply halt, biodiversity loss. Adding up the existing protected areas and the indigenous people’s territories where biodiversity is protected would put the current global proportion above 30%, the NGO said.

The agreement includes the concept of nature-based solutions, widely used in the climate world but seen as controversial in biodiversity. A group of green finance experts signed a document before COP15 criticising



The white-faced saki is indigenous to the Amazon rainforest. Latin America and the Caribbean has experienced the greatest regional decline in average wildlife population abundance, at 94% between 1970 and 2018. (Image: Jane Rix / Alamy)

the concept for promoting biodiversity offsetting, which could create environmental and social problems.

The way forward

None of the 20 objectives for protecting biodiversity at the global level were fully achieved under the previous 10-year biodiversity agreement, known as the Aichi targets, according to a UN report in 2020. But negotiators said they have learnt their lesson, and the new agreement includes provisions to make the targets measurable and to track countries’ progress.

“While Leo Messi and teammates now get to hang up their boots and luxuriate in a hard-fought victory, for the global biodiversity community, the next phase of hard work already beckons: mainstreaming the framework’s architecture into country-level policy,” said Andrew Deutz, director of global policy at the Nature Conservancy.

The new agreement is not legally binding but governments will have to show progress towards meeting the

targets via national biodiversity plans. These are akin to the national climate plans, known as nationally determined contributions (NDCs), which countries already use to demonstrate progress towards meeting the Paris Agreement.

“The framework is balanced and solid: it has a clear public funding mobilization target and this target is the fruit of the hard work of many countries,” said Li Shuo, a climate and energy campaigner at Greenpeace China.

He added: “All the prominent targets, such as 30×30, controlling pesticides and pollution, and reversing the tendency of extinction have been dealt with properly.”

Avaaz acting CEO Bert Wanders said the promises made at COP15 to deliver money for biodiversity, put a third of the planet under protection and protect the right of indigenous people are a significant step forward to protecting life on Earth.

“But on its own it won’t be enough. Governments should listen to what science is saying and rapidly scale up ambition to protect half the Earth by 2030,” he added. 🔄

Ecological redlines triple China's protected waterbird sites

China's ecological redlines policy could improve the conservation potential of migratory birds and other species by expanding protected areas



The Mai Po Nature Reserve in Shenzhen Bay, full of egrets, ducks, gulls and waders (Image: Alamy)

China started planning an “ecological redlines” policy in 2011 to protect certain ecologically important areas by ensuring their size, nature and functionality remained unchanged. To assess the potential biodiversity benefits of the redline system, we recently compared coverage by national nature reserves and by redline areas, finding that the new system triples the number of important waterbird sites protected in China.

Establishing such protected areas is essential to conserving biodiversity. In 2010, at the COP10 negotiations under the UN Convention on Biological Diversity (CBD), a global target was set of protecting 17% of the world’s land and 10% of its ocean by 2020. This was only partially achieved.

The world urgently needs new and more ambitious targets to prevent the rapid loss of global biodiversity. One such proposal, presented in a draft of the CBD’s “post-2020 global biodiversity framework”, is to have 30% of land and ocean areas protected by 2030. This will be discussed at the second and final part of CBD COP15 in Montreal on 7–19 December. It was also a key agenda item at the recent COP14 of the Convention on Wetlands.

The ecological redlines policy could meet the CBD’s definition of an OECM or “other effective area-based conservation measure”. Since 2019, when the IUCN published guidance on recognising OECMs, along with a database, they have counted towards protected area targets.

China protects about 4.1% of its ocean area with various types of reserve, but ecological redlines cover over 25% of its land and sea areas (and include the vast majority of reserves). So, classing redline areas as OECMs would make a huge contribution to achieving the CBD’s targets, both for China and other countries if they were to adopt a similar system.

In our assessment of the potential biodiversity benefits of the redline system, we compared coverage by

Redlines and nature reserves: what’s the difference?

Ecological redlines demarcate areas that provide important ecological services, including shallow coastal waters, wetlands, glaciers and forests.

The redlines cover far more territory than other kinds of protected areas in China, and often, they are home to extensive human activities. This means they cannot all be sealed off in the same way as nature reserves. In some cases, such as reservoirs and sources of drinking water, the primary goal of redlines was not to protect wildlife, but wildlife has benefited nonetheless.

The redlines have been drawn based on rigorous scientific assessment. Other protected areas are often the result of a compromise between ecological and local development needs. The “top-down” design of the redline system means decision-makers manage the entire landscape in a unified and holistic manner. Of course, this is sometimes easier said than done. Effective redline management requires experimentation, innovation and flexibility.



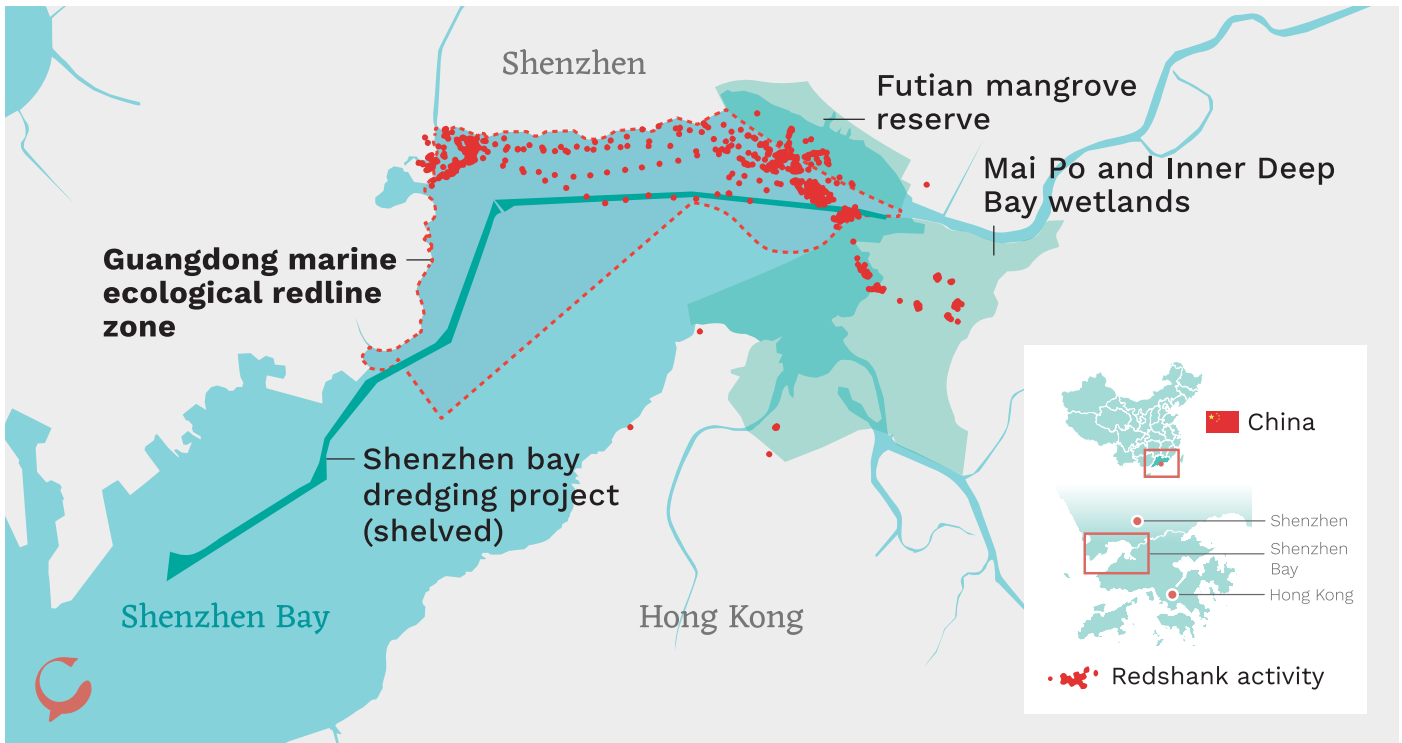
172 coastal waterbird sites in coastal China, and their protection status: Unprotected sites are marked white, those within 4km of national nature reserves are blue, and sites protected only by ecological redlines are orange. (Source)

national nature reserves and by redline areas of 172 wetlands that provide important habitats for waterbirds. We found 42 of these fell within national nature reserves. When redline areas are considered too, the number jumps to 126.

Our calculations were based on conservative estimates of waterbird activity. We defined a site as protected by a national nature reserve if it was within 4km of one. In reality, waterbirds may commute further afield between foraging and resting sites. Our research only referred to reserves with the strictest protections and clear data on boundaries. We did not consider whether the 172 sites were part of reserves at levels other than the national level. We found that some key wetlands are only protected by the redline system.

These included wetlands in Pinggang, Guangdong and Xichang, Guangxi, which surveys have recently identified as regular wintering and resting grounds for the spoon-billed sandpiper. Their significance for this critically endangered bird means they meet the standard for recognition as an internationally important wetland. But setting up a conventional reserve takes considerable time and resources, and requires coordination across

The movement of a single common redshank in Shenzhen Bay



government departments. Fortunately, the two sites already had some measure of protection as they were near redline restriction areas (meaning appropriate development is possible only if the size, nature and function of the area remain unchanged) set up to protect fishing, tourism and mangrove swamps, and a marine redline ban zone (where no development is permitted).


There is a similar situation with the great knot, a Class II protected bird. Surveys have recorded 60,000 great knots, 14% of the global population, stopping to rest and feed in Liaoning province's Yingkou and Gaizhou before continuing on their migratory journey. But the knots also use other sites that are not part of national nature reserves. Redline restricted areas again offer some protections.

Ecological redlines don't just protect far-off, unnamed wetlands – the system once saved Shenzhen Bay itself from development. The bay lies across the river from the Mai Po Wetlands, and some of its intertidal wetlands are important waterbird habitats, despite lacking national nature reserve protections. Monitoring found that waterbirds such as the common redshank, which winter on Shenzhen Bay, do not confine themselves to the Mai Po Wetlands or the nearby Futian Mangrove Nature Reserve – they are found all over the bay's coastal wetlands and shallow waters. In 2020, a developer hoping to run

Various kinds of protected area combine to protect all parts of Shenzhen Bay that are important for waterbirds (Map: China Dialogue Ocean)

sightseeing ferries proposed dredging a navigation channel through the wetlands. The plans were rejected, in part because of the redline status.

We have found that accounting for redline areas triples the number of important waterbird sites protected in China. If properly implemented and managed, the system could have significant benefits for waterbird conservation.

China does not yet have a system to identify or certify OECMs. But if redline areas were to be recognised as such, the country could expand the size and scope of its internationally recognised protected areas and conserve biodiversity that falls outside of the existing reserve system – as well as providing a model to be followed elsewhere around the world. 



14%

of the great knot global population stop to rest and feed in Liaoning province's Yingkou and Gaizhou



Financial institutions could be doing more to integrate sustainability standards into their processes, while managing environment-related financial risks for themselves (Image: Xinhua / Alamy)

AQUACULTURE

Finance is crucial to making fishing and aquaculture sustainable

China's small boats and fish farms present a challenge to government oversight. The financial sector can help.

Chen Qianming | December 7, 2022

The fishing and aquaculture industry is important for China's economy and the livelihoods of the more than 17 million people who work in it.

It is becoming more apparent that overfishing and poorly managed aquaculture is causing pollution, biodiversity loss and habitat destruction, threatening ecosystems and the industry's future.

Fishing and aquaculture are expected to provide 69 million tonnes of seafood for China between 2021 and 2025. A transition to sustainability is key to ensuring the

industry's resilience and protecting the environment. In fact, this is now a national strategy, visible in the central government plan for the industry during the 14th Five Year Plan period (2021–2025), which stresses the importance of sustainability.

The regulation-heavy approach to sustainability

Management of fishing and aquaculture currently relies on government oversight. Gradual improvements have been made over recent years by limiting the number of boats and the size of their engines, and placing caps on overall catch size.

Technical measures, such as closed seasons and restrictions on fishing gear, have also been put in place, along with aquaculture permitting and capacity planning.

However, the top-down approach to tackling problems means regulators predominantly shoulder the challenging burden of managing the different fish populations, vessels, fishing gear, aquaculture techniques, inputs and resulting pollution.

The sector is mainly made up of small operators and a few big firms. The millions of people employed in it along the length of China's coast use a wide range of techniques to produce a diverse catch. The measures and regulations that the authorities employ need input from scientific research. The implementation of command and control is further complicated and made more costly by the decentralised and unstandardised ways that fish are produced. Regulation should not be the only approach.

In addition to command and control regulations, the transformation of the sector is also being helped by changes to subsidies (for example, a switch from fuel subsidies to fishery stewardship subsidies), technical innovations, and construction of fishing industry zones and other infrastructure.

How could finance help manage fishing?

Besides relying on government regulations, the financial sector can play an important role as it is skilled in resource allocation and risk management, meaning it could support the sustainable development of the fishing and aquaculture industry.

In a recent series of reports – “Financing Sustainable Seafood” – the International Institute of Green Finance (IIGF) and the WWF Beijing Office presented joint research into the link between seafood finance and sustainable development.

Financial institutions, which provide loans and insurance products, would reduce their own risks by



The implementation of command and control is further complicated and made more costly by the decentralised and unstandardised ways that fish are produced.

driving a sustainable transition in the fishing and aquaculture industry. This is because harm to the environment caused by the industry equates to environment-related financial risks for financial institutions. The loss of fishery resources, as well as algal or jellyfish blooms, and fish diseases, are physical risks that directly threaten the industry.

Financial institutions also face transition risks as China tightens regulation of fishing and aquaculture. These include longer closed seasons, quotas, tougher standards for aquaculture effluent, and more investment in law enforcement, such as the fishery authorities' “Bright Sword” campaigns. Fishers and fish farmers must invest to comply with regulations, or face fines or closure. Meanwhile, food safety and environmental demands are increasing at home and abroad, adding to the risk of products becoming uncompetitive or facing barriers to market entry.

Financial institutions need to identify, assess, monitor and control such risks or they could result in a borrower failing to make repayments or an insurance policyholder claiming more than expected. Doing so would help avoid losses while also guiding the fishing and aquaculture industry towards sustainability.

Pathways to sustainability

Financial institutions can promote sustainable fishing and aquaculture practices by integrating sustainability standards into their processes.

Institutions should make access to lending and insurance contracts conditional on environmental performance. Unsustainable production practices often imply lower operating costs, meaning firms that employ them are likely to perform better financially and more easily access loans and other financial services. Screening clients based on environmental performances at an early stage helps to prevent the phenomenon of “bad money driving out the good”.

Institutions should also better supply the fishing and aquaculture industry's demands for green finance, funding and insurance for sustainable production (specifically for sustainable fishing activity).

The contribution of financial institutions to the sustainable transition and risk management of China's fishing and aquaculture industry is limited. The focus on financial performance and operational risks mean there is minimal incorporation of sustainability as a concept in their provision of financial services. Environmental impacts are given little if any consideration. Sustainability clauses are not regularly included in loans and insurance contracts. Few insurance and loan products are designed for sustainable production practices. And there is no system in place for managing environment-related financial risks.

This is primarily due to the nature of the fishing and aquaculture industry. Producers are small and widely distributed. They deploy

a range of production methods. Information on production and environmental impacts is limited, making it difficult for financial institutions to obtain a comprehensive understanding of the industry. Monitoring production and environmental impact is therefore expensive and increases the costs of risk management.

The contribution of financial institutions to the sector is also stymied by a lack of general policy guidance promoting sustainability and green finance tools. The inherent operational risks in the fishing sector make financial institutions reluctant to provide services; instead they need to be forced to by government policy. General green finance taxonomies, which are designed to help financial institutions identify suitable projects, lack compatibility with the sector. The Green Industry Guidance Catalogue and the Catalogue of Projects Supported by Green Bonds, which are supposed to guide green finance and green bond issuance, cover only more modern fishing activities and are therefore of very limited applicability to the sector.

Stakeholder involvement

If finance is to play its proper role, while managing relevant financial risks, a collective effort by a range of stakeholders is needed.

The natural characteristics of the fishing and aquaculture sector will need to be addressed to take down its financing barriers. There

should first be organisation and aggregation: cooperatives, industry associations and NGOs should bring seafood producers together to permit mobilisation at scale.

Second, information availability and transparency should be addressed. New technology can increase the accessibility of basic information about the sector, such as the location, area and owner of an aquaculture pond, and information on processes, such as when vessels depart from ports and their catches, or the timing, frequency and quantity of feeding in aquaculture.


For example, the ChinaBlue Sustainability Institute works with local fishing communities in Hainan province, as well as with industry associations and financial institutions, to aggregate and organise the otherwise decentralised and scattered producers, and make information more widely available. By working with NGOs like ChinaBlue, financial institutions can communicate with stakeholders and improve their knowledge of the sector. They can also invest in training and recruiting personnel with interdisciplinary experience and improve their knowledge about the financial needs of the sector.

Government policy is a key driver of the financial services provided to the sector. Guidance and appropriate policy tools are needed to put financial services on a sustainable path. That includes sending clear policy signals to encourage financial institutions to promote sustainability.

The agricultural and financial regulators should also produce policy tools, such as specialised taxonomies for the fishing and aquaculture sector or lists of projects and firms to avoid supporting. Some international organisations have carried out preliminary research. The UN Environment Programme's "Finance Initiative" (UNEP FI) reports series on the blue economy includes an overview of activities to exclude from financing, based on factors such as pollution, fishing method and labour conditions. The International Finance Corporation's (IFC) Guidelines for Blue Finance present key factors that financial institutions should consider when selecting recipients for their services. The standards proposed are mainly based on certification schemes such as that operated by the Marine Stewardship Council (MSC). The authorities can also encourage sustainable financial products and services by subsidising preferential interest rates and insurance premiums.

Finally, financial institutions need to build environmental considerations into their decision-making processes by developing financial products that promote sustainable development and manage the financial risks associated with environmental performance. Internal management adjustments could include setting up departments to assess environmental performance and manage environment-related financial risk in the sector.

In financial services provision, clauses on environmental impacts should be included in credit and insurance agreements, with long-term monitoring to ensure sustainability and effective risk management.

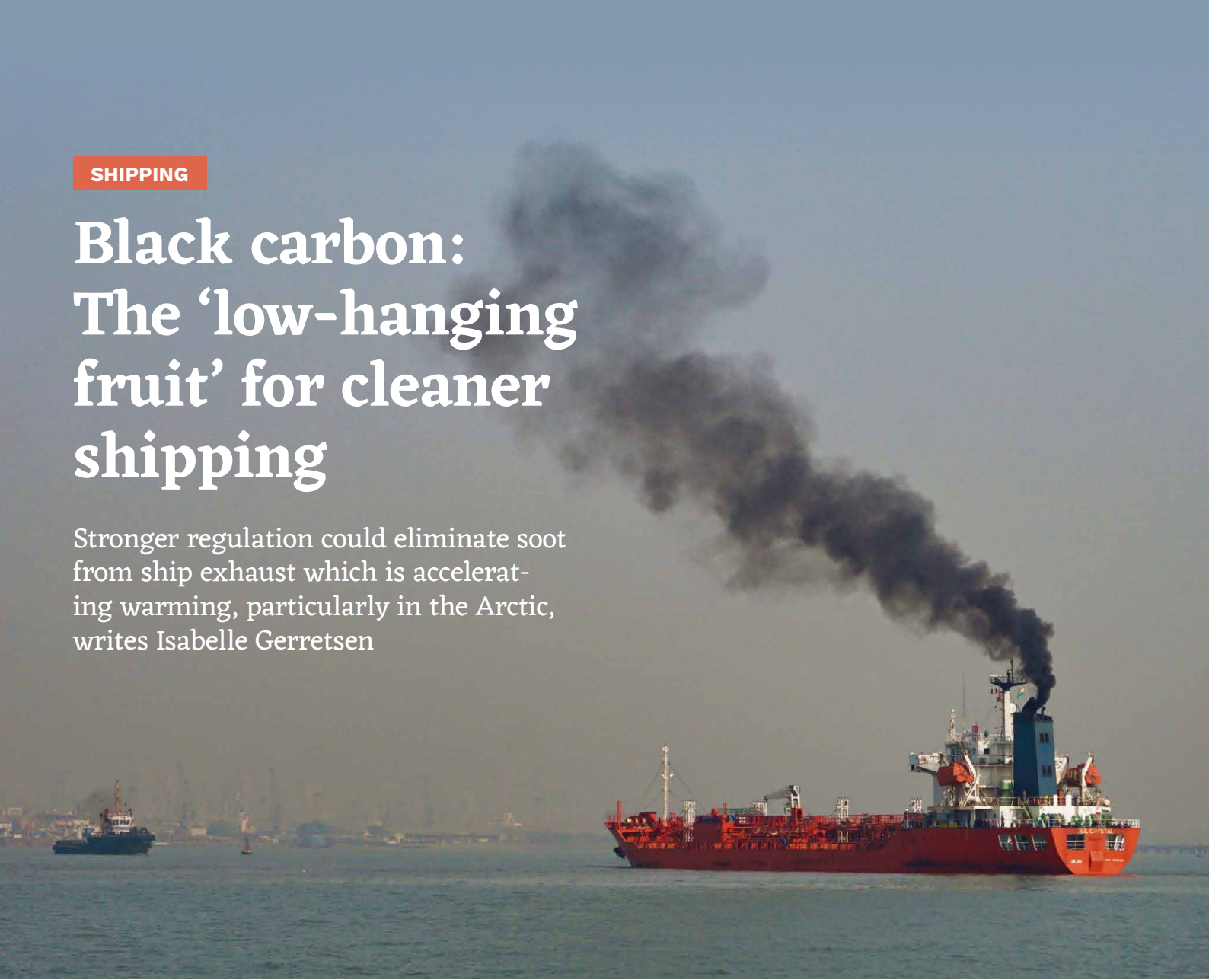
At the product level, green insurance and loans for the sector require innovation and cooperation with NGOs, firms and the government. For example, ChinaBlue has worked with local marketing associations and insurance providers to create an insurance product specifically for tilapia as well as to embed sustainability standards into other financial products and services. 



In financial services provision, clauses on environmental impacts should be included in credit and insurance agreements, with long-term monitoring to ensure sustainability and effective risk management.

Black carbon: The ‘low-hanging fruit’ for cleaner shipping

Stronger regulation could eliminate soot from ship exhaust which is accelerating warming, particularly in the Arctic, writes Isabelle Gerretsen



Ships that burn heavy fuel oil emit dirty exhaust containing black carbon. These sooty particles supercharge global heating in polar environments and threaten the livelihoods of Arctic communities. (Image: Cyprien Hauser / Flickr, CC BY-ND)

Isabelle Gerretsen | April 4, 2023

Shipping is a highly polluting industry. Between 2007 and 2012, it was responsible for roughly 3% of global greenhouse gas emissions from fossil fuel use and industrial processes, or around one billion tonnes of CO₂ equivalent per year.

Ship exhaust may also contain “black carbon” – sooty particles that absorb sunlight and trap heat in the atmosphere, contributing to global warming. Black carbon rapidly accelerates ice melt when it lands, by darkening surfaces and thus reducing how much sunlight they reflect. At the

same time it poses a serious health risk to coastal communities.

Environmental groups say this climate and health threat could easily be eradicated if ships were forced to use cleaner fuels.

The impact on warming

Black carbon is produced when ships burn heavy fuel oil, which is “a hazardous, toxic tar-like fuel”, says Andrew Dumbrille, an advisor to both the Clean Arctic Alliance, a group of 20 nonprofits, and to the Inuit Circumpolar Council, which represents all Inuit from Alaska,

Canada, Greenland and Chukotka on internationally important matters. “It is literally the stuff at the bottom of the barrel,” he says.

“You have to heat it up to use it... it’s like burning tar, one could walk on it,” he says. “Our global trade system is enabled by this highly polluting by-product fuel.”

Black carbon emissions are responsible for around 20% of the shipping industry’s climate impact over a 20-year period, according to the Clean Arctic Alliance.

It is “especially damaging, and has a disproportionate impact, when it is released in or near the Arctic,” says

Sian Prior, lead adviser to the alliance.

The Arctic is already warming almost four times faster than the global average, at 0.73C per decade compared to the global average of 0.19C per decade between 1979–2021, according to a 2022 study by Finnish researchers.

“When black carbon settles in the polar environment... the surface starts absorbing more and more heat because it’s dark,” says Prior. “So you lose the albedo effect, which is the reflectivity of the snow and the ice.”

This leads to a vicious cycle of warming. Less sea ice means more open, dark ocean which absorbs more heat and accelerates temperature rise, not just in the Arctic but worldwide.

“Some of that warming is going to be transported further south,” says Pam Pearson, director of the International Cryosphere Climate Initiative. “So a warmer Arctic also translates into warmer mid-latitudes because of black carbon.”

If the Arctic sea ice melts completely during the summer, there is going to be “so much more sea level rise and extreme weather globally,” says Pearson.

A 2021 report by the Climate Crisis Advisory Group warned that the Arctic is “ground zero” for cascading climate impacts across the planet.

Rising temperatures there are leading to warmer ocean temperatures and shifts in atmospheric circulation, and are expected to weaken the jet stream, leading to more extreme weather.

The impact on Arctic communities

“The melting of sea ice is [causing] global climate disruption, but also local, cultural disruption,” says Dumbrille. Black carbon’s impact is already being felt by indigenous communities living in the Arctic.

There are serious health risks associated with exposure to black carbon. A component of fine particulate matter, black carbon has been linked to lung and heart disease



A glacier in Iceland. When black carbon settles on ice, the darker surface absorbs more heat (Image: Alamy)



An Inuit resident of Nain Bay, Canada checks real-time measurements of sea ice thickness along ice highways. The data is collected from buoys and electromagnetic sensors installed as part of a climate adaptation programme used by over 30 Inuit communities. (Image: Melissa Renwick / Alamy)



In the same town on Canada’s frozen northeast coast, Katie Winters scores Arctic char to make pitsik (dried fish). There are fears that black carbon could contaminate seafood, the main food source for Inuit communities. (Image: Melissa Renwick / Alamy)

and can impair cognitive and immune functions.

“Black carbon is changing our culture,” says Lisa Koperqualuk, vice president international of the Inuit Circumpolar Council.

She explains that the rapid melting of ice is drastically changing the Inuit way of life by delaying harvesting seasons and making it more difficult for communities to travel. “We call the ice our highway,” she says. “We use it to travel and to go hunting on the edge of the sea ice.”

There are concerns that black

carbon could contaminate the main food source for Inuit communities, seafood, according to Koperqualuk. “The migration patterns of animals could also change [as the ocean warms] because there are some marine mammals that follow colder waters,” she says.

“The Arctic is a very important area to protect and to keep as pristine as possible, not only for our culture, but for the [entire] world,” says Koperqualuk. “The Arctic is linked to the rest of the globe. So protecting it is protecting the world as well.”

The rise (and fall?) of black carbon

Between 2015 and 2019, the Arctic saw an 85% rise in black carbon due to increased shipping traffic.

“Black carbon emissions are increasing because there are more and more ships going to the Arctic. In recent years, there have been more oil tankers and bunker carriers going to the Arctic,” says Prior.

Maritime traffic grew by 25% between 2013 and 2019, while the distance covered by ships in the region increased by 75%.

The increase in shipping traffic in the Arctic is “very much related to the loss of sea ice,” says Prior. The ice is also “forming later in the year and melting earlier,” she says. This means that more ships are able to sail for longer periods in the Arctic region.

It’s leading to a “really nasty feedback loop,” says Pearson. “As you lose more sea ice, you get more ships, more emissions, [and] less sea ice.”

There is an easy way to rapidly cut black carbon emissions, according to environmental groups.

If all ships using heavy fuel oil were to switch to a cleaner distillate fuel (similar to diesel) there would be an immediate reduction of around 44% in black carbon emissions from these ships, according to the Clean Arctic Alliance. If all ships also installed diesel particulate filters, which capture soot, black carbon could be reduced by over 90%.

Black carbon is a short-lived climate pollutant with a lifespan of just a few days or weeks, whereas CO₂ can remain in the atmosphere for 300 to 1,000 years. This means that black carbon could rapidly disappear from the atmosphere if regulations were introduced.

“Black carbon could be resolved very quickly, which is why we call it the ‘low hanging fruit,’” says Prior. “Whereas with carbon dioxide you’ve got a very potent warming gas that is staying in the atmosphere for hundreds of years.”

If the European Union required ships sailing in the Arctic to switch from bunker fuels to cleaner distillate



An icebreaker tows a cargo ship through ice close to the Yamal liquefied natural gas plant on Russia's Arctic coastline. As climate change melts more sea ice, routes open up for more ships, which in turn emit more planet-heating gases. (Image: Valerii Kadnikov / Alamy)



Black carbon could rapidly disappear from the atmosphere if regulations were introduced

fuels, it would reduce their black carbon emissions in Arctic waters by 50–80%, according to analysis by the International Council on Clean Transportation (ICCT).

Technically, it is easy for ships to make the switch. “It’s seen as an overnight solution, because ship engines can run, and already do run, on both heavy bunker fuel and lighter distillate fuel,” says Dumbrille.

“Most engines can just switch between the fuels. In fact, they often do already,” says Prior. “Ships often use the lighter diesel fuels in the coastal waters, and then switch over to the heavy fuels when they’re offshore.”

But uptake of distillate fuels is lagging due to cost. They are more expensive due to higher demand (especially from road vehicles) and because they require more refining,

says Dumbrille.

“It’s about twice as expensive to use the cleaner fuel,” says Bryan Comer, who leads the marine programme at the ICCT.

The need for stronger regulations

Regulations are needed to force ship operators to switch to distillate fuel. In November 2021, the International Maritime Organization (IMO), the UN body overseeing shipping, adopted a resolution urging ship operators to switch to cleaner fuels in the Arctic in a bid to reduce black carbon emissions. But it was a voluntary measure, which relied on governments to introduce supportive policies. Environmental groups are calling for mandatory regulations to drastically slash black carbon



An icebreaker tows a cargo ship through ice close to the Yamal liquefied natural gas plant on Russia's Arctic coastline. As climate change melts more sea ice, routes open up for more ships, which in turn emit more planet-heating gases. (Image: Valerii Kadnikov / Alamy)



The container ship Godafoss ran aground in Norway in 2011, and began leaking heavy fuel oil into the sea close to the Yttre Hvaler national park (Image © Kent Inge Olsen / Greenpeace)



A red boom was used to try and limit the spread of heavy fuel oil across the ocean surface. Clean-up operations are especially difficult in ice-covered areas. (Image © Jon Terje Hellgren Hansen / Greenpeace)

emissions in the Arctic.

Regulations are already in place around the North American coastline, where the IMO introduced an emission control area (ECA) in 2012, requiring ships to limit their nitrogen oxide (NOx), sulphur oxide (SOx) and particulate matter pollution. This regulation has incentivised many ship operators to switch to distillate fuel. ECAs have also been established in the Mediterranean, the North Sea and Baltic Sea.

Environmental groups would like the North America ECA to be

extended to the Arctic.

“Arctic communities were overlooked when the North America ECA was established,” says Comer. “Some would argue that’s environmental injustice and environmental racism.”

It is important that existing loopholes, which enable ship operators to continue using heavy fuel oil, are removed from new IMO regulations, experts argue. Currently, many ships in the ECA use scrubbers to remove their exhaust fumes from the atmosphere and comply with

regulations, without having to switch to a more expensive distillate fuel.

“There are loopholes within the ECA... so you can still carry on using heavy fuel oil but install a scrubber to reduce your sulphur emissions,” says Prior.

Although scrubbers reduce air pollution, they are still incredibly polluting as they dump the chemicals removed from the exhaust directly into the ocean. By using scrubbers, “you are taking an atmospheric pollution problem and turning it into an ocean pollution problem,” says Prior.

If the North American emissions control area is extended to the Arctic “you’d want to see that high sulphur fuels would not be allowed, even if ships have a scrubber,” says Comer. “Instead, they should be required to use distillate fuels.”

A proposal to extend the ECA is likely to be brought to the IMO this year, but it won’t get much air time until 2024, says Comer. This year the IMO is set to review its long-term emissions reduction strategy and decide whether to adopt a net zero by 2050 target.

The current IMO target, which campaigners say is woefully inadequate, is to halve shipping emissions by 2050. Without further action, shipping emissions are projected to reach 90-130% of their 2008 levels by 2050.

“It is very inadequate,” says Dumbrielle. “To be aligned with the Paris Agreement, [the target] needs to be at least 100% by 2050, ideally 100% by 2040, and 50% by 2030.”

“If you’re thinking about a 50% reduction in greenhouse gas emissions by 2030, dealing with black carbon should be at the top of your list,” he says.

“I’m not holding my breath at the moment... it’s going to take a couple more years,” says Prior, noting that there is still quite a lot of opposition within the industry. “It’s frustrating when [tackling black carbon] should be low-hanging fruit, especially compared to what needs to happen to decarbonise the whole sector.”



SHIPPING

Global shipping to speed up voyage away from fossil fuels

Ned Molloy considers the steps needed to realise the IMO's stricter climate targets

Ned Molloy | July 31, 2023

Deal! Hundreds of delegates from around the world rise to their feet, smiles break out from behind diplomatic poker faces, and applause fills the huge plenary room of the UN's International Maritime Organisation (IMO) in London.

There had been two weeks of intense negotiations, but 7 July was one of those UN moments – like the signing of the Paris Agreement itself – that we wait years for. Governments had finally agreed tougher climate targets for global

shipping, an industry that emits 1 billion tonnes of CO₂ a year. For scale, the entirety of south and central America emitted 1.3 billion tonnes in 2022.

But was it real? Will this agreement really lower emissions? And is it aligned with the Paris Agreement? Let's take a closer look.

The IMO's stricter climate targets

The main part of the deal was to agree on more stringent climate targets, that reduce emissions faster and further.

What IMO had previously was a

commitment to “at least halve” shipping emissions by 2050. The revised target this month is for shipping to reach net-zero emissions “by or around, i.e. close to 2050”.

That convoluted language was the price of bringing countries already committed to bringing shipping emissions down to zero by 2050 together with countries that have later domestic net-zero targets (such as China's 2060), and others for whom the concept of aiming for zero emissions is still a stretch.

Nevertheless, significant progress has been made.

Shipping companies must invest heavily to meet the IMO's goals to reduce the industry's emissions 30% by 2030 and to reach net-zero by “close to 2050” (Image: Bodo Marks / Alamy)

What about action even sooner? IPCC climate scientists tell us that this decade is essential for bringing down cumulative emissions to keep global warming to 1.5C.

Here, Pacific Island states, particularly the Marshall Islands, Solomon Islands, and Vanuatu, showed immense diplomatic skill and resilience. They persuaded other countries to agree on stretch goals of “at least 20%, *striving for 30%*” emissions reduction by 2030 (compared to the IMO’s fixed baseline of 2008), and “at least 70%, *striving for 80%*” by 2040.

These targets are still not aligned with the Paris Agreement’s 1.5C temperature ceiling. That would have required emissions cuts of around 36% by 2030, according to the Science Based Targets Initiative, which helps companies set emissions reduction targets based on scientific evidence. That level was supported by the Pacific Island nations, US, Canada, and the UK.

However, the stretch targets were as far as the Pacific Island countries could move others, and still mean a reduction in cumulative emissions of a whopping 10.8 billion tonnes CO₂ equivalent out to 2050 compared to the Initial IMO Strategy adopted in 2018 (a drop from 27.9 billion tonnes to 17.1 billion tonnes). That’s as much as shutting down 42 coal-fired power plants of 1 GW capacity each, with their full lifetime of 40 years remaining.

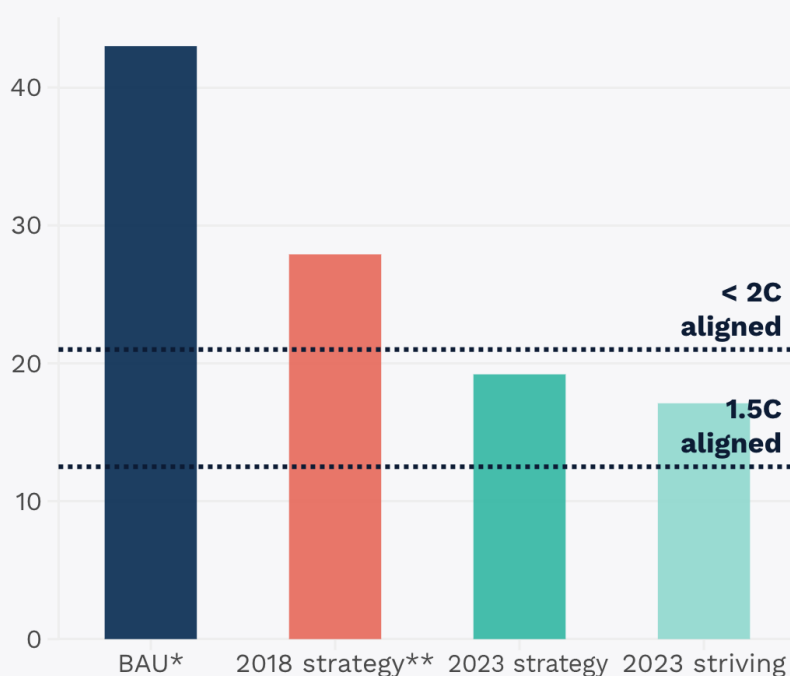
There’s a big “if” though. Will countries actually achieve these reductions they have agreed to?

China, Brazil and Argentina could only accept these ambitious numbers by calling them “Indicative Checkpoints” rather than a target. That raises doubts among climate NGOs of whether all countries are serious about meeting them.

Outside emissions reductions, IMO also agreed new goals to scale-up green technologies, setting a goal of between 5% and 10% “zero or near-zero greenhouse gas emission technologies, fuels and/or energy sources” in shipping by 2030.

That broader language of “energy sources”, rather than just fuels, was a big win for the booming and diverse group of wind-propulsion technology start-ups.

Cumulative shipping emissions 2020–2050 Gigatonnes of CO₂ equivalent



Source: [ICCT](#) • *BAU = business as usual
**As laid out in the Initial IMO Strategy adopted in 2018

Twenty-eight cargo ships already have wind-assisted propulsion in operation on the water this year, according to the International WindShip Association. This year, next year and 2025 onwards will see the launch of new cargo ships with wind power as their main energy source.

That’s encouraging, but enormous and rapid scale-up is required, to get wind technologies retrofitted on a significant share of the 60,000 large cargo vessels plying our oceans.

How will the IMO meet its new goals?

So how does IMO plan to reach its ambitious 2030 goals? At its July summit, the organisation agreed to finish designing mid-term “measures” (legally enforced policies to actually drive emissions reductions) by 2025, to come into force in 2027.

The basket includes both an “economic” and a “technical” candidate measure. The economic measure will be

some sort of carbon-pricing mechanism – whether a simple agreed levy (eg US\$100) on each tonne of greenhouse gases emitted, a feebate programme, or a cap-and-trade system (in which the price per tonne would vary according to market forces).

Economic measures help close the price gap between currently expensive green fuels, and cheap tax-free fossil fuel, and they also raise revenue. This money will be crucial considering we need between \$50 billion and \$70 billion a year of investment to fully decarbonise shipping by 2050, according to the Global Maritime Forum.

The big unknown is whether some of the potentially huge revenues raised by a carbon price on shipping can be spent outside the shipping sector itself, to strengthen countries’ climate resilience and adaptation. This approach is supported by Pacific nations most threatened by climate change, and endorsed by the World Bank.

Meanwhile, countries that currently dominate the global shipping industry, such as China, Japan, and Korea, are keener for that money to be kept within the shipping sector itself.

Many countries at IMO spoke in favour of a “just and equitable” transition, that “leaves no one behind”, which would seem to imply investing at least some revenues outside of the sector, but will this be followed through on?

The technical element will be some sort of Greenhouse Gas Fuel Standard (GFS), basically a mandate that each ship (or maybe each shipping company) must use a growing percentage of zero-carbon fuels each year, displacing oil use.

This could be a very powerful lever to decarbonise shipping – comparable to the regulation that has led to booming electric vehicle sales in Europe and China. However, the devil is in the detail of how the regulation would treat biofuels and Liquefied Natural Gas (LNG), both of which can often lead to higher emissions than bunker fuel, depending on land use considerations, and levels of methane slip.

Will the 2030 goals be met?

A bigger question looms over this entire timeline agreed at IMO. Even if a well-designed green fuels mandate and a reasonably high carbon price of around \$100 per tonne come into force in 2027, does that leave enough time to meet the ambitious 2030 goals just three years later?

I asked the IMO’s outgoing secretary general, Kitack Lim, if he was confident the 2030 targets would be met, given that short three-year runway?

He said the short-term measures already agreed would do much of the work.

“EEXI [Energy Efficiency Existing Ship Index] is already in place, CII [Carbon Intensity Index] is already in place. This is ongoing already. On top of that, we’ll add a fuel standard, and an economic measure. That’s why I believe the 2030 target will be accomplished. Why? Already we are seeing shipping moving towards the 40% [carbon intensity] reduction target by 2030.”

That carbon *intensity* target of 40% improvement by 2030 was left unchanged this month from the Initial Strategy. And while Mr Lim is right that shipping is



A container ship by a station near Bremen, Germany, for measuring the sulphur emissions of vessels passing in the North Sea (Image: Mohssen Assanimoghaddam / Alamy)

on course to meet it, that doesn’t mean we’re anywhere close to reducing *outright* emissions by 2030, given the expected growth in global trade volumes.

Indeed, the EEXI policy will only nudge shipping emissions about 1% off its business-as-usual growth pathway by 2030, according to ICCT, leaving outright emissions significantly *higher* by then.

So, clearly, the hard work of getting to 30% outright emissions reduction by 2030 – IMO’s agreed target – won’t be done by IMO itself.

Perhaps that’s unfair. There’s a certain self-fulfilling momentum created when governments agree to non-binding targets. Just look at the Paris Agreement, and the booming wind and solar investment that has followed.

UMAS, a maritime consultancy, argues that the IMO’s 2023 Strategy “sends an unequivocal signal to investors that ships being ordered today, and many already built, have to be capable of running on zero-emission fuels”.

What must companies and countries do?

So the onus really is on the industry itself now, to invest at the levels needed to meet the IMO’s 30% emissions reduction by 2030 goal, and the 10% zero GHG fuels/energy sources by 2030 goal. So far, shipping companies have seemed keener to give their windfall 2021/2022 profits to shareholders as dividends, rather than invest.

One key development to watch will

be how the industry responds to the “Request for Proposals” this year by some big companies who want to ship their goods on zero-emission freight services. Which container lines will step up, and how competitive will the offers be?

Individual countries are also going to have to seriously step up their actions in this sector, to have a chance of achieving what they’ve agreed to internationally at IMO.

Countries can include their international shipping routes in their climate targets (as the UK has), mandate that plug-in shore power be used by all ships calling at their ports in the near future (as the EU has), empower their ports to take climate action, subsidise production of green hydrogen (as the US has), clean up domestic inland shipping routes with battery-powered ships (as China is), and start to put serious cash behind their many commitments to establish green international shipping routes.

Countries can also turn up at the COP28 climate talks this year with shipping included in their Nationally Determined Contribution (NDC) under the Paris Agreement – to show they’re serious about achieving what they’ve said they will at IMO.

With stronger national action in this sector, significantly ramped up corporate investment, and mandatory, well-enforced carbon pricing and green Fuel Standard agreed in 2025, July’s IMO summit will be seen as a major turning point towards a world of green global trade. 🌍

In Latin America, resistance to deep-sea mining is growing

Experts from the region are calling on the International Seabed Authority to be more transparent and allow more time for research

Jack Lo Lau | October 31, 2022

Almost a year ago, Sandor Mulsow told China Dialogue Ocean that the body charged with both protecting the international seabed and developing rules to govern its exploitation, the International Seabed Authority (ISA), is in fact promoting mining. Mulsow is a former head of environment and minerals at ISA.

The allegation of lack of neutrality raised by Mulsow was not discussed at the most recent ISA assembly on 1–4 August this year, according to attendees interviewed by China Dialogue Ocean. Yet we are just nine months away from seabed mining potentially beginning under whatever regulations exist in July 2023.

That is because, in July 2021, the Republic of Nauru triggered an arcane rule that could obligate the ISA to allow exploitation within two years. One of the last official forums to debate all this before the deadline will be the final ISA session of the year, running from 31 October to 11 November.

The richest submarine area for these minerals is the Clarion-Clipperton zone, which spans 4.5 million square kilometres in the Pacific Ocean, between Mexico and Hawaii. Exploitation would begin here. Its proximity is of great concern not only to Mexico, but the whole continent.

We have sought the views of several Latin American experts. They all agree that there is very little scientific evidence about what we have (and stand to lose) on the seabed, and that the ISA is being

permissive regarding the commencement of mining.

One of the main arguments given in favour of deep-sea mining is the need for minerals to accelerate the crucial transition to renewable energy. However, the interviewees point out that if mining is not well regulated, it would harm the heritage of humanity and future of the planet.

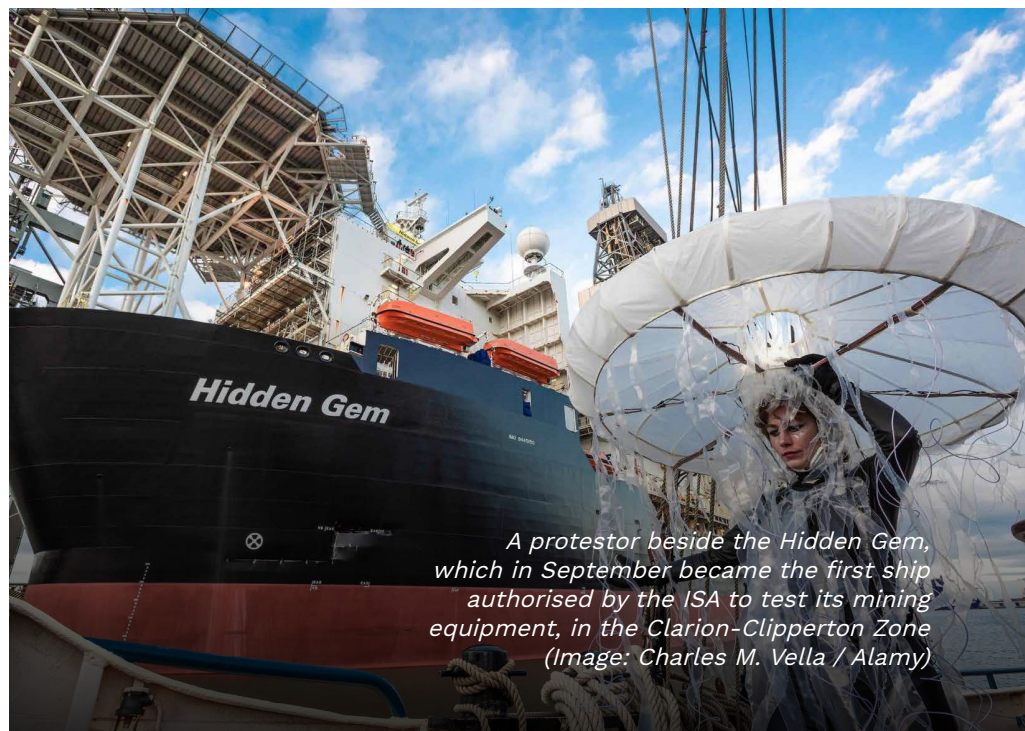
Mexico: 'We are very concerned'

In 2016, a concession was awarded for the Don Diego mining project in Mexico, located off Baja California. The project aimed to extract 350 million tonnes of phosphate from the seabed over 50 years but it had no environmental impact study or prior consultation with local people. In the face of "strong opposition from fishing cooperatives, academic sectors and civil organisations", the project was cancelled, explains Violeta Nuñez

Rodríguez, a professor and researcher at Mexico's Metropolitan Autonomous University, who has studied and published on sea mining.

"After what happened with Don Diego, we are very concerned about the impacts that could be generated by the beginnings of seabed mining, especially in the Clarion-Clipperton area, which is very close to our coasts. In the event of any impact, Mexico would be the first country to be affected," she said. "There has been no in-depth debate on the issue in Mexico."

Ignacio March Mifsut, director of evaluation and follow-up of Mexico's National Commission of Natural Protected Areas, said at a forum in Mexico City in early October, that mining in the Clarion-Clipperton zone "is going to affect the entire Pacific of Mexico and also Central America", but that to understand exactly how requires



A protestor beside the Hidden Gem, which in September became the first ship authorised by the ISA to test its mining equipment, in the Clarion-Clipperton Zone (Image: Charles M. Vella / Alamy)

more research. March Mifsut says it is necessary “to monitor ecosystems, physical and chemical oceanographic processes,” before, during and after any mining activities. “We know that [Clarion-Clipperton] mining is here, and unfortunately we had to have it 30 kilometres away.”

Núñez adds that it seems the ISA “doesn’t see the danger that exploitation and alteration of the different ecosystems could mean. If we already have a brutal problem in terms of climate change, I don’t want to imagine what it will be like when we start exploiting the seabed. It is a very complex situation to start activities without proper studies and clear regulations. And as always, the most vulnerable [people and other animal species] will be the ones most affected.”

Chile: ‘The ISA is dragging its feet’

“The main problem with sea mining is that they are accelerating the start of it without scientific knowledge,” Diego Lillo Goffreri, a lawyer with AIDA’s Ecosystems Programme and part of the NGO team present at the August ISA assembly, told China Dialogue Ocean.

Lillo Goffreri says the idea that deep-sea mineral deposits are needed to help build the technology that will transition the world towards renewables “is not agreed upon by the international community”.

“Exploring the [Clarion-Clipperton] area would mean disturbances that we have no idea about. Species perhaps not known to science could be seriously affected.” There has not much progress made in deep-sea research in recent times, he adds.

“Who will control international waters, who will regulate, how will the benefits that supposedly belong to all humanity be shared? There is no clear legislation. Before it promotes deep-sea mining, the ISA needs a modern legal vision that adapts to environmental challenges, that helps protect the planet” continues Lillo Goffreri. “The feeling we have is that the ISA is dragging its feet, rather than taking firmer decisions. Action must be taken before July next year.”

Costa Rica: ‘Lack of knowledge’

Costa Rica’s ambassador to Jamaica and representative at the ISA assemblies, Gina Guillén, is one of the most active people at the meetings.

She told China Dialogue Ocean: “This is an issue that concerns all of humanity, but only 40 countries attend the meetings. I don’t think it’s indifference. I think it’s more a lack of knowledge. For a long time, here in Jamaica [at ISA headquarters] things have gone by without a word being said and there hasn’t been much participation from the countries.”



As always, the most vulnerable will be the ones most affected

Violeta Nuñez Rodríguez
Metropolitan Autonomous University

She believes that as long as the decision-making process is not clear “no decisions should be made.” It is not possible to finish drafting regulations by July 2023, she says, adding that we should wait until we have enough scientific evidence before proceeding to mine. “We have to realise that we are putting the fate of the planet at stake.”

While experts such as Sandor Mulsow believe the ISA is pro mining rather than pro protection, Guillén is more cautious in her appraisal: “The Secretariat has to be neutral. That is its role. It has to be mindful of the importance of effective protection of the marine environment.” But she says “ISA needs to work more on transparency. Their processes are not transparent, they don’t have clear and uniform procedures. They need to improve on that.”

Another situation that worries Guillén is that according to the ISA’s agenda for the ongoing 31 October to 11 November meeting, “only two hours of the last day is allocated to discuss deep-sea mining

and the beginning of activities. It has been relegated to something minor. The future of the planet is an add on. Half of the oxygen we breathe comes from the ocean and we don’t seem to understand that”.

In this the UN Decade of Ocean Science for Sustainable Development, Guillén is calling for “investment in research, concentrating on the Clarion-Clipperton zone, where all the current interest is, so that we can make more informed decisions.”

Peru: ‘More consultation need’

“I was at the mid-year meeting of the ISA, representing young people, and the feeling is that the ISA aims to eventually approve deep sea mining regulation, said Daniel Cáceres, representative of the Sustainable Ocean Alliance in Latin America. “There needs to be a global consultation of young people” to make these decisions, he added.

In addition to these demands, the marine biologist – who is part of a campaign to collect signatures against sea mining – believes there should also be an ecological and economic analysis of the damage that could be caused, considering the human populations that depend on the sea.

Juan Carlos Rivero, biologist and scientific director of the NGO Oceana Peru, adds that “nature and evidence show us that accidents always happen. That is why there is a need for well-regulated control in the exploitation zones. Down there, where nobody can see, they can do anything.”

In the late 1980s, two German scientists trialled mining in a manganese-rich area 4,000 kilometres off the coast of Peru. They raked about 20 square kilometres, causing a sediment plume that wiped out animals including sponges, soft corals and sea anemones. Twenty-five years later, when the last assessment was undertaken, these animals had barely recovered.

Rivero believes mining is bound to start at some point. “We have to be really prepared for it, not like we are at the moment,” he says. “We have to be clear that in such fragile ecosystems, any slightest alteration can have an incalculable cascade effect”.

Six ways the ocean could (potentially) mop up CO₂ emissions

Several proposals exist for enhancing the ocean's carbon-capturing capacity. But they are nascent, untested and may cause more problems than they solve

David Adam | September 21, 2023

As anyone who has enjoyed a fizzy drink knows, CO₂ dissolves in water – refreshing news for our gullets, and good news for our planet. With more than 70% of the Earth's surface covered by the water in our ocean, this basic physical process acts as a brake on global warming on a massive scale.

Since the dawn of the Industrial Revolution, a quarter of humanity's CO₂ emissions from the burning of fossil fuels have been absorbed by the ocean. The seas, in other words, have

helped to clean up our mess. In doing so, they have lowered greenhouse gas levels in the atmosphere and limited global warming.

Unfortunately, as the rate of human-driven emissions has increased, the oceans have been unable to store carbon away quickly enough to prevent warming entirely. But could they?

Some scientists believe the carbon-uptake of the oceans can be artificially accelerated. They have suggested a range of technologies, from the complex to the very simple. If successful, they could help us in coming decades as the world struggles to move towards a low-carbon economy.

Ocean-based carbon dioxide removal (CDR) schemes, as they are called, are controversial. They are mostly untested – certainly at the scale that would be required – and could come with damaging side effects. They could be expensive and might act as a distraction from the urgent need to reduce emissions. But they could also offer a helping hand when we most need it.

As the profile of such CDR proposals rises, a growing number of scientists are weighing up their risks and benefits. A key report from the US National Academies of Sciences, Engineering and Medicine has identified the following possible methods as the most promising,

Options for enhancing the ocean's capacity to take in carbon include restoring ecosystems like kelp forests, adding minerals such as lime and using electricity to boost alkalinity (Image: Daniel Poloha / Alamy)

Iron seeding

One of the oldest CDR ideas, iron seeding, also known as iron fertilisation, seeks to exploit the natural use of carbon by huge swarms of photosynthetic plankton.

Just like trees on land, these plankton use sunlight and CO₂ to produce energy and grow. In doing so, they incorporate the carbon into their microscopic bodies. And when they die and sink to the deep ocean, they take it with them.

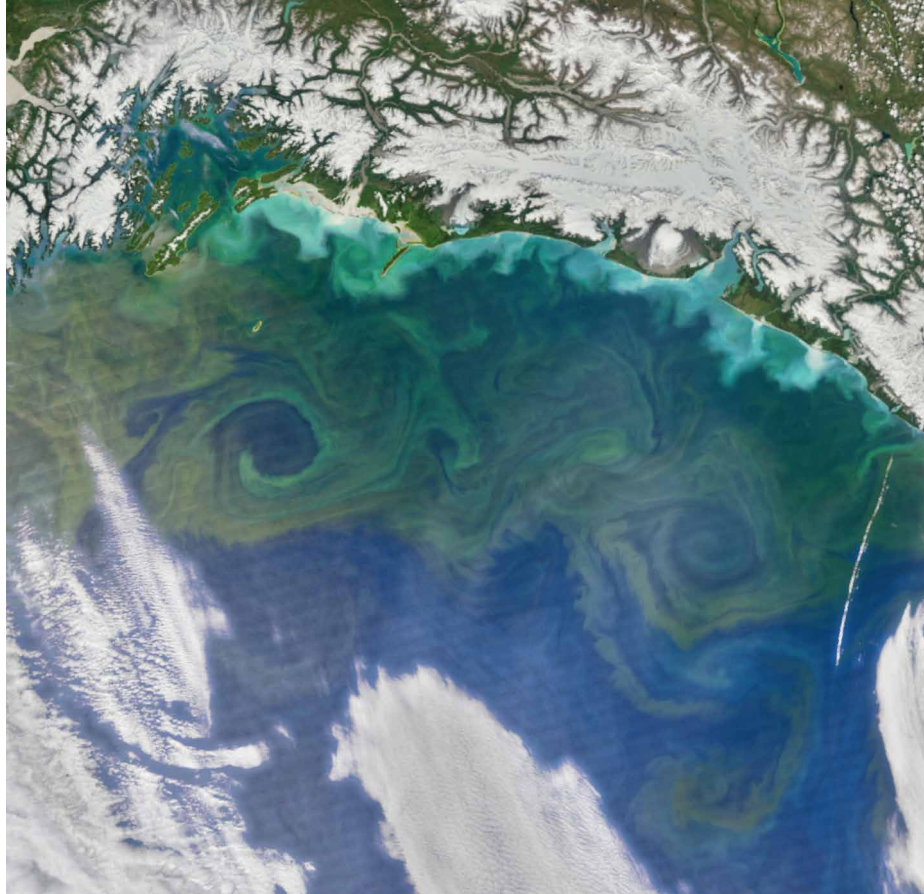
That doesn't sound like much. But given there are an estimated octillion – a billion billion billion – phytoplankton spread across the global ocean, they are the single biggest way that carbon from the atmosphere ends up in the oceans.

Phytoplankton need nutrients to grow, which can be in short supply in seawater. In fact, scientists know that the growth of many types of phytoplankton is limited by a lack of iron. The theory goes, if you want more phytoplankton and more carbon removal, just add iron to the top layer of the sea where the phytoplankton grow. Think of it as fertiliser. In some ways, this CDR method would imitate nature. Natural fertilisation with iron happens when currents bring nutrient-rich water up from the depths, or winds spread iron-containing dust and volcanic ash across the sea. One proposal to enhance this process is to boost the atmospheric content of iron with aerosols, though most trials dump iron sulphate from ships.

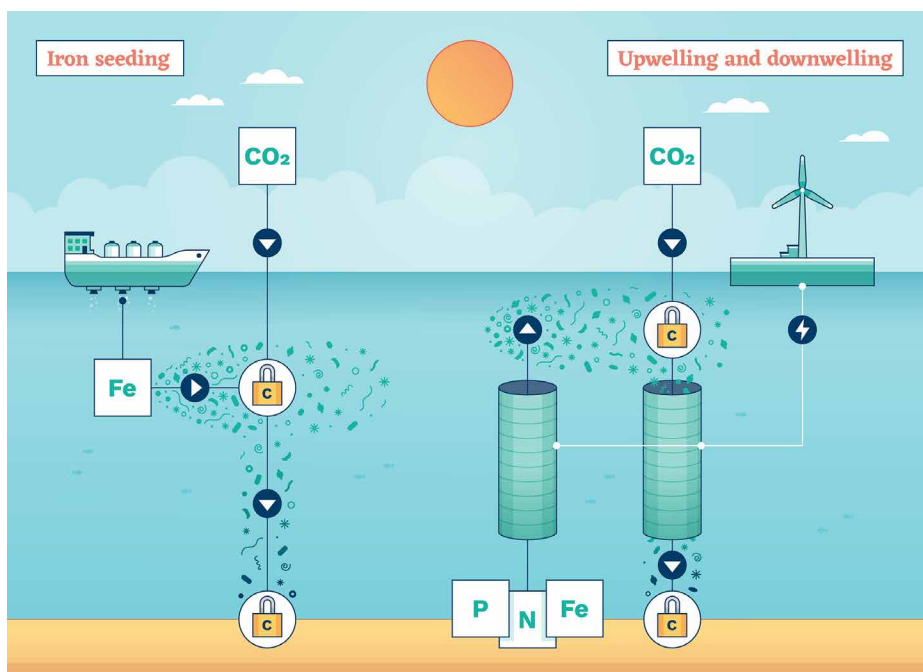
There are concerns over the environmental impacts of the addition of vast amounts of iron to the ocean, which could disturb the ocean ecosystem and have knock-on effects on food chains due to the growth of algal blooms. Some small-scale experiments have been carried out to test the idea and more are planned.

Upwelling and downwelling

Phytoplankton that live near the ocean surface remove carbon from the atmosphere and carry it to the deep sea when they die – a process helped when deep ocean currents bring up nutrient-rich water from below. So, instead of adding iron from above, maybe science and technology could give this natural fertilisation of phytoplankton a boost?



A satellite image of a natural phytoplankton bloom (the swirls of green) in the Gulf of Alaska. It was caused when the tide helped distribute iron from the land into nitrate-rich waters offshore, creating a nutrient-rich environment. (Image: NASA's Earth Observatory / Flickr, CC BY NC)



Iron seeding involves adding iron to the ocean to fertilise phytoplankton, which capture CO₂ in their bodies as they grow. When they die, they fall to the bottom of the ocean, locking the carbon away. Upwelling and downwelling also aims to encourage the growth of phytoplankton. But instead of adding iron, the plan is to bring nutrient-rich waters up from the deep ocean using pipes. To aid the process of locking carbon away, this technique also involves piping phytoplankton-rich surface water down towards the deep ocean. (Graphic: James Round / China Dialogue Ocean)

Artificial upwelling is a carbon removal technology that could achieve this. It's another simple concept: vertical pipes in the ocean could bring deep water to the surface, where it could promote the extra growth of plankton. To help that upward flow, and to speed the deposit of carbon-rich water from the surface into the deep ocean, another set of pipes could carry water in the other direction. That's called, quite predictably, artificial downwelling.

Less predictable is just how all this water could be moved around. The vertical pipes would need to be hundreds of metres long and up to 20 metres wide to shift enough water to make it worthwhile. Some plans have them moored to the seabed, and in others they float.

Pumping liquids is, however, expensive and energy intensive. So where would the energy come from? Might solar panels do the job? Could the action of waves at the surface help nudge the surface water down? Might the equipment break down or disintegrate and only add to the problem of ocean pollution? Many questions remain for a scheme that clearly has its ups and downs. Numerous small outdoor experiments in the deep ocean, lakes and fjords have taken place, on varying scales. There are concerns that, if performed on a large scale, the technique will alter the density and temperature profile of the ocean, with possible impacts on sea life.

Farming seaweed

Just like phytoplankton, seaweed takes CO₂ and uses it to grow. In fact, phytoplankton are themselves a form of seaweed – a catch-all term used to describe a wide range of marine plants and algae.

Most plans to cultivate and farm seaweed focus on the plants that grow in rocky coastal waters, which presents a problem for carbon storage. Unlike the phytoplankton that can fall for thousands of metres through the deep sea and bury their carbon in seabed sediment, larger coastal seaweeds have long been thought to mostly disintegrate in shallow water and come to rest on hard stone surfaces at the

bottom. These surfaces are more likely to be disturbed, making it more likely that this carbon will be re-released into the atmosphere. But some research says it's more complicated than that, and that much carbon from coastal seaweed can indeed end up in deep-sea sediment.

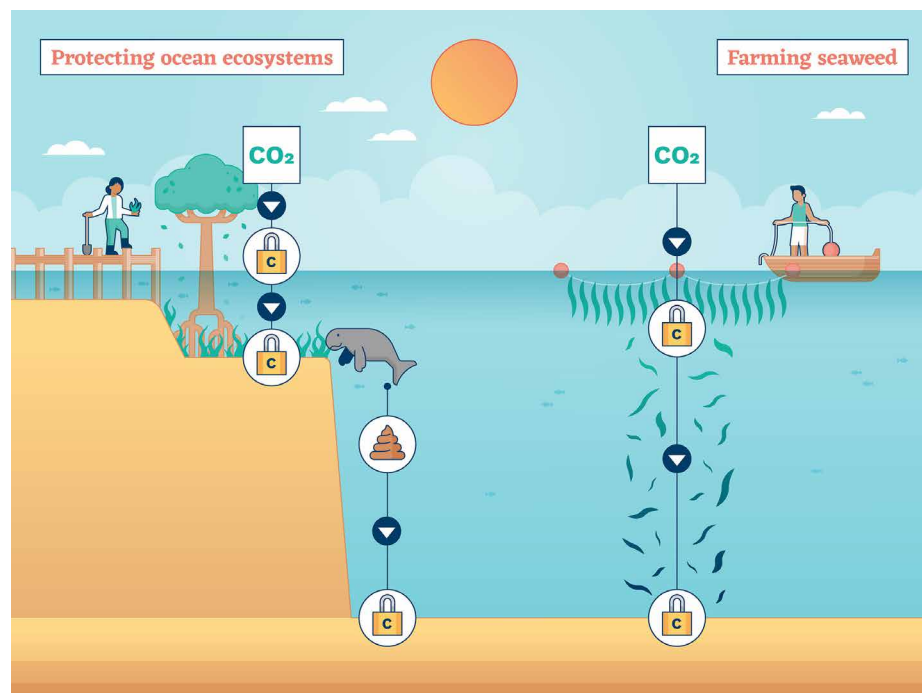
Either way, just like planting trees on land, growing more seaweed is an attractive way to trap and store carbon for a while – the key is what to do with it next. Perhaps it could be harvested and used as biomass for energy. Or it could be fed to animals, or people. Incentives would be important: some proponents of seaweed cultivation for carbon storage argue that it should generate credits that can be sold to consumers and companies to offset their own greenhouse gas emissions. Seaweed farming is already done around the world, but it would need to be significantly scaled up to have an impact on climate. And some are anxious that setting up yet more

infrastructure in the ocean could impact existing marine life.

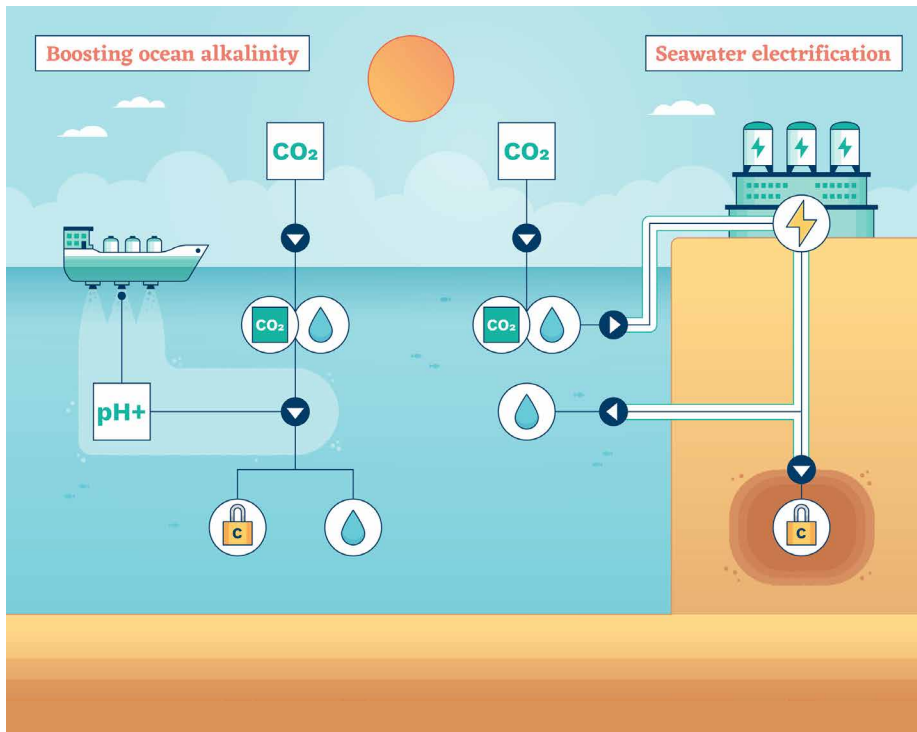
Protecting and restoring ocean ecosystems

Mud, glorious mud. Unloved and unnoticed for years, sediment-rich coastal ecosystems that fringe the oceans are now a hot topic in carbon accounting. Mostly mangrove swamps, salt marshes and seagrass meadows, these mushy frontiers between the land and sea sit on a rich abundance of carbon. Organic matter in the form of leaves, wood, roots and dead marine life hold giant stocks of carbon that have built up over thousands of years.

A frequent casualty of coastal development, such ecosystems are often dug up, destroyed and drained, which can release all the carbon they had previously stored into the atmosphere. So, preventing further destruction by raising awareness of



Coastal ecosystems such as mangrove swamps, salt marshes and seagrass meadows store huge amounts of carbon by gathering sediment that locks away dead organic matter. Protecting and restoring these habitats will help remove more CO₂ from both seawater and the atmosphere. Farming more seaweed does the same, although it's less clear how the carbon these macroalgae capture as they grow can be locked away over the long term. (Graphic: James Round / China Dialogue Ocean)



Boosting ocean alkalinity is a method of removing CO₂ by adding crushed materials such as lime to seawater. This triggers chemical reactions that convert dissolved CO₂ into more stable molecules that lock the carbon away. Passing an electric current through seawater similarly has an impact at the molecular level, either boosting alkalinity or releasing CO₂ gas that can be captured. (Graphic: James Round / China Dialogue Ocean)

their value and protecting what's left is an excellent start.

On top of that, it is possible to add to their carbon-carrying capacity, by restoring and replacing lost and degraded coastal ecosystems.

Two recent changes are helping achieve both protection and restoration. Firstly, these gloopy sediment-filled ecosystems have been rebranded, as the storers of so-called “blue carbon”, which sounds far more attractive. And secondly, blue carbon schemes are now eligible to generate carbon credits, which means companies are racing to hand over money to projects in exchange for offsets against their own greenhouse gas emissions.

But, much like their tree-based counterparts, the carbon removal realised through the restoration of blue carbon ecosystems is only long-lasting if they remain protected and undisturbed.

Boosting ocean alkalinity

Some chemistry: when seawater that contains dissolved CO₂ becomes more alkaline – that is, less acidic – the change triggers a series of chemical reactions. The end result is that the CO₂ converts to different molecules, including carbonates and bicarbonates.

This is good for two reasons. First, these new molecules are more stable and so more likely to keep their carbon tied up and not release it back to the atmosphere. Second, removing dissolved CO₂ enables the water to absorb more of the gas from the atmosphere, to take its place. Both these processes can help tackle global warming.

Also called weathering, this process happens naturally as alkaline rocks or shells from sea creatures slowly dissolve in seawater. So,


perhaps we can speed it up? The plan would be simple: add crushed alkaline minerals and materials, such as lime, to beaches to be weathered and washed into the sea, or directly into the ocean from ships. There would be another environmental benefit too: the added alkaline material would combat the rising acidification that is resulting from the ocean absorbing humanity's carbon emissions. On the other hand, mining for the necessary minerals would be a destructive practice, and deliberately adding them to the sea could see a build-up of trace toxins in sea life. Still, field trials are planned.

Seawater electrification

More chemistry: passing an electric current through seawater causes molecular chaos. The charge breaks the bond between the hydrogen and oxygen molecules of water (H₂O, of course), and when liberated, these separate components trigger reactions, including with the sodium and chlorine of salt (NaCl).

These reactions can be harnessed to free CO₂ from seawater in a few ways. Commonly discussed are: a method that captures a stream of CO₂ gas liberated from seawater, which could be collected and stored; and a way to generate alkalinity, which encourages the chemical conversion of dissolved CO₂ to more stable carbonate forms.

Both these ideas leave behind seawater that contains a lower content of dissolved CO₂ than before, leaving it primed to absorb more from the atmosphere. So, a system could work something like this: pump in seawater to a treatment facility, electrify it, pump it back to the ocean. Whether that could be done in a cheap and sustainable way depends on the details – not least finding a renewable way to generate the required electricity.

Modelling and theoretical calculations suggest the idea could work, and some researchers now want to build the equipment needed to demonstrate the technique. 



A poster on a wall in Paris, France reads: “2050: More plastic than fish. Refuse catastrophe!” (Image: Robert K. Chin / Alamy)

PLASTICS

World moves closer to a global plastics treaty

Delegates have gathered in Paris to work on a global agreement to end plastics pollution. What are the outcomes for the ocean?

Emma Bryce | June 20, 2023

Each year, an estimated 200 tonnes of plastic drifts down the River Seine through Paris and into the sea. It’s a tiny fraction of the 14 million tonnes that tips into the ocean annually. The problems in the ocean are pronounced, but plastic is now so ubiquitous that it affects all ecosystems. So, in late May, delegates from 180 nations came to the French capital to begin laying out the first treaty to control plastic production and waste.

On 2 June, weary delegates and observers left the week-long meeting with a sense of relief. Many nations had agreed in principle on some of the core elements of a future treaty. These included the need to cap plastic production, manage microplastics and ghost gear, and regulate high-risk plastic products and the chemicals that leach out of them.

A “zero draft”, a reference document for the final treaty, is to be written by the next meeting in

November, with the goal to have the final agreement enforced in 2025.

Despite suspicions over industry lobbying, and delays caused by procedural debates, environmental campaigners are hopeful for an effective treaty. “Right now, we’re in a good place. We’re basing that optimism on the large number of countries who actually want to commit to something meaningful,” says Eirik Lindebjerg, global plastics policy manager at WWF.

There was a sense from civil society that it must keep up the pressure on governments between now and November to make sure ambitious elements make their way into the zero draft.

Delay tactics slow progress

The meeting, convened by the United Nations Environment Program (UNEP), was called INC-2, as it was the second of five to be held by the International Negotiating Committee, the body formed to draft the treaty. The whole process was triggered in February 2022 when nations adopted a historic resolution on plastics in Nairobi.

The Paris meeting, held at UNESCO headquarters, was the first time delegates could get stuck into discussing what the treaty text might contain. Countries had submitted a wishlist of options ahead of time. Delegates split into two “contact groups” – one to discuss the elements of the treaty text, the other to talk

about implementation mechanisms such as financing and technology transfer. The goal was to build a clear picture of what countries want in the zero draft.

But this process got off to a rocky start, with nations gridlocked in closed-door debates over procedural issues. These hinged on disagreements about whether future provisions would be passed by vote or by consensus.

Some observers saw this as a tactic by certain countries to delay the contact group talks. “The main country drivers included Saudi Arabia, Russia, and India. Brazil also contributed, but perhaps in a secondary position,” says Sirine Rached, global plastics policy coordinator at non-profit the Global Alliance for Incinerator Alternatives (GAIA).

Rached said that, notably, these nations refused the option to simultaneously work on both the vote versus consensus issue and the negotiations. Many experts have noted that the dissenting nations have large

fossil fuel and petrochemical interests, which underpin the plastics industry.

The deadlock was broken by Wednesday night when nations agreed to record the differing opinions in the meeting report but left the problem unsolved. Civil society groups fear this leaves the issue to resurface at future meetings and potentially slow negotiations. However, the compromise did allow the talks to continue at INC-2.

Countries opting for holistic approach

In recent years, understanding has shifted from plastic being a problem of waste alone, to it being a material that causes harm to the environment and people, across its lifecycle.

Its fossil fuel feedstocks generate emissions that increase ocean warming. Chemicals added during production threaten the health of humans and other species. In nature, it can smother ecosystems, cause disease, disrupt breeding and kill wildlife, all while gradually fragmenting into microplastics that infiltrate the air, water, and bodies of fish we eat – delivering the problem back to us.

This harmful waste is tied to plastic’s accelerating production: we make 400 million tonnes of the material annually and 40% of that is disposable packaging. New plastic is constantly entering the world and yet we’re not managing it: 50% of all plastic festers in mounting landfills, and another 22% lands up in uncontrolled dumps sites, or the wider environment.

“The entire system is broken, and it requires a complete reshaping of the global plastics economy,” says Christina Dixon, ocean campaign lead at the Environmental Investigation Agency (EIA), a UK-based nonprofit.

Prior to the talks, a coalition of High Ambition governments, as well as civil society groups, had emphasised that to address the full scope of concerns, a treaty should include legally binding obligations to cap virgin plastic production, to design safer products for reuse and refill,



A plastic bag made by oil producer and major polluter ExxonMobil, used to store seedlings at a tree nursery in Nakuru, Kenya (Image: James Wakibia / Alamy)

and include financing mechanisms to enable these changes.

Paris was a chance to show this commitment during the contact group talks. From the perspective of civil society who attended the meeting, there were some clear wins. Observers at the group talks said there was widespread agreement on measures to ban, regulate, and dial back the production of high-risk polymers and plastic products (which could include single-use items). Similarly, “it was really encouraging to hear not one or two, but a significant number of countries calling for significant production cuts, with no ambiguity,” says GAIA’s Rached. A coalition of companies, including Unilever, is also pushing for reduction.

Observers said that country statements issued during the contact groups discussions were also largely supportive of including measures in the final treaty to regulate the chemicals added to plastics, which have a tendency to leach out, explains Anja Brandon, associate director of US plastics policy at the Ocean Conservancy, a non-profit based in Washington DC.

Large industry presence

Despite this progress, the presence of 190 representatives from plastics and petrochemical industries drew concern from civil society groups about lobbying. There were already suspicions about industry’s influence on UNEP when the body published a solutions report in the lead up to INC-2. A consultancy firm called Systemiq which helped draft the report also consults for the plastic industry, says Neil Tangri, science and policy director at GAIA.

“Both the content and the process by which this report was prepared were highly questionable,” he says. The document included controversial downstream waste-management measures like chemical recycling and incineration. Both cause harmful emissions, while research



*Recycling is
a hot mess*

**Bethanie
Carney-Almroth**
ecotoxicologist

in the US has found that chemical recycling rarely reduces virgin plastic production, because most of the waste plastic this process uses as raw material is transformed into fuel or chemicals, not useable plastic.

Some companies and several countries either gave statements or made submissions in the lead up to INC-2 that prioritised the role of downstream measures in solving the crisis, rather than upstream curbs on production. But scientists like ecotoxicologist Bethanie Carney-Almroth caution that even widespread downstream measures like recycling can’t dig us out of the growing trash pile that runaway production has made. She explains that’s partly because of the mind-boggling array of 13,000 chemicals used to make plastics, and the ingredients that “migrate into plastics” from the substances they contained, such as pesticides.

Several of these chemicals are hazardous, and the diversity makes it near impossible to separate plastic in waste streams. “Right now, recycling is a hot mess... What we’re looking for is a transition to a safe and sustainable future, and the way things are done now does not allow for that,” says Carney-Almroth, who studies the environmental impacts of plastic and its chemicals at the University of Gothenburg in Sweden. These challenges limit the material’s circularity, and partly explain why just 9% of plastic is recycled globally.

Limited access for NGOs

Controversy over inclusion fed into the tensions that simmered beneath the surface in Paris. Before the meeting, UNEP said that five members could be registered per NGO, and NGOs believed that all five would then have access to the UNESCO building, Dixon says. But just two weeks before the meeting, UNEP announced it would limit the number of access badges to one per NGO. Several participants who had planned to attend decided to opt out: “Many people, who had invested a lot of money bringing front line communities and Indigenous peoples, as well as small global south NGOs, to the meeting, could no longer guarantee any substantive participation,” Dixon explains.

The Centre for Environmental International Law called on UNEP to prioritise civil society representatives, who they said had more cause to be there than the 190 industry representatives. While access did improve over the course of the event, for those who had cancelled travel, it was too late – meaning that INC-2 had a smaller civil society delegation than originally planned.

UNEP explained that due to the number of organisations who had registered, the size of some country delegations, and space constraints at the venue, they had had to impose a limit on numbers. But the process fuelled suspicion: “It seems like there’s a coordinated effort to keep us quiet,” says Jo Banner, a co-founder of the non-profit Descendants Projects, which advocates for residents of Louisiana’s Cancer Alley. “It’s really bad... that we don’t have access to really communicate what our communities are facing.”

Implementation approach

WWF analysis of countries’ pre-INC-2 submissions showed that 135 states agreed that the treaty should contain legally binding elements, not only voluntary measures – and there



Sorting plastic bottles at a recycling plant in Nakuru, Kenya in the midday heat. Waste-pickers are often overlooked in efforts to improve waste management, despite being responsible for nearly two-thirds of global recycling. (Image: James Wakibia / Alamy)

was a similar level of support for this at the talks, Lindebjerg says.

A treaty with legally binding elements would, for instance, require countries to take specific actions to achieve the overarching goal of the plastic treaty to reduce pollution. This is different to the voluntary approach taken in the Paris Agreement, for example, where states are left to decide their own steps to reducing greenhouse gas emissions.

Legally binding measures are essential considering the transboundary movement of ocean plastic, says Sefanaia Nawadra, director general of the Secretariat of the Pacific Regional Environment Program, which oversees the interests of Pacific Island nations, particularly affected by plastic waste. “The whole reason we are coming to this negotiation is that a global mandate is needed. National and regional action hasn’t been able to fix this issue,” Nawadra says.

Promising support for reducing ocean harms

The ocean received the spotlight at key points in the talks. There was almost unanimous agreement that the treaty should ban or control intentionally added microplastics. Several nations also raised statements in support of measures to manage ghost fishing gear. This contributes 20% of marine plastic pollution, and is considered especially harmful to wildlife.

“Support for the inclusion of [measures on ghost gear], while not universally expressed, is looking promising,” says Joel Baziuk, associate director of the Global Ghost Gear Initiative. He noticed a larger focus on oceans in Paris compared to INC-1. “I think that’s a significant win, and hopefully the conversation continues in that direction.”


Civil society: keeping the momentum going

WWF’s Lindebjerg says the goal between now and INC-3 in November

is to maintain momentum, and watch out for attempts to water down the zero draft and upcoming treaty text.

Several civil society groups have pledged to track lobbying efforts, and push for better inclusion of underrepresented groups. Meanwhile, Dixon, from the Environmental Investigation Agency, says negotiators have to get stuck into the details of what a robustly written treaty text should say, “particularly around chemicals in plastics and plastic polymers, and how restrictions could work in practice.”

Between now and INC-3, nation representatives will meet informally to discuss some of the details of the zero draft and to identify gaps.

There’s a lot to get through in the coming six months – let alone the next two years – to reach that treaty goal by 2025. Global Ghost Gear Initiative’s Baziuk says: “It’s optimistic, but I think it reflects the urgency of the problem.” 

BIODIVERSITY

How ‘soundscaping’ is supporting coral reefs in the Maldives

Scientists are using underwater microphones to monitor reef health, and recordings of thriving examples to bring animals back

Rebecca L Root | September 15, 2023

As the Indian Ocean laps around the Laamu Atoll in the Central Maldives, seven small recording devices are nestled into coral reefs several metres below the surface, capturing the sounds of the sea. While the recordings could create a soothing playlist, scientists are in fact using them to expand the frontiers of marine conservation.

There might be a clicking noise from sea anemones, deeper tonal sounds from angel fish vibrating their swim bladders, or the crackling of snapping fish, explained Jess Hodge, a marine biologist and research coordinator at the Maldives Underwater Initiative (MUI). The marine conservation initiative was founded by Six Senses Laamu and is based at its resort in the southern part of the atoll.

“On top of that, we have the noises of the fish eating and also vocalisations,” Hodge said, adding that

some of these can’t be heard by the human ear.

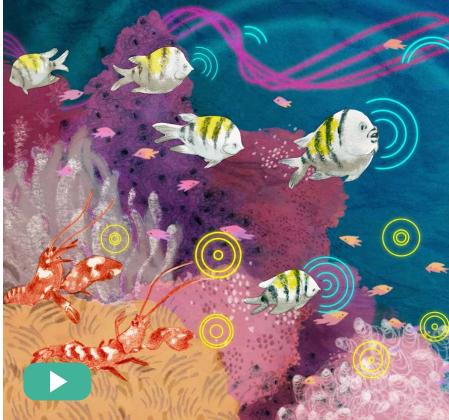

“It’s this combination of different sounds that makes up the soundscape of the reef... and we’re some of the first people to actually hear the Maldives’ fish vocalise,” Hodge said.

Such specialised recordings are being used in a new collaboration between coral reef ecologists, led by MUI and Steve Simpson, a marine biologist and fish ecologist at the University of Bristol, to better distinguish between a healthy and a degraded reef in need of support.

“You can use this soundscape as essentially a measure of biodiversity,” Hodge said. For example, the more snapping shrimp that can be heard, the healthier a reef is likely to be, she explained.

The scientists are also looking to use soundscaping to bring life back to degraded reefs, by playing sounds of healthy reefs through underwater speakers to coax species back.

Scan the QR code to watch on your phone or click the screenshot to watch on computer



This audio, recorded by Steve Simpson of Bristol University, shows what a healthy reef sounds like. The croaking comes from sergeant majors, a common genus of reef fish. (Illustration: Kabini Amin / China Dialogue Ocean; Audio: Steve Simpson)

The threats that silence coral reefs

Around the world, healthy coral reefs provide habitat, feeding, spawning and nursery grounds for over one million species. They also play a key role in supplying food and livelihoods for people living nearby, act as coastal defences and provide a wealth of tourism opportunities through diving and snorkelling.

Yet, a multitude of threats, including pollution, overfishing, coral harvesting and rising ocean temperatures, have put them in jeopardy.

“We know that corals are in real trouble this century, and anything that we can do to increase the chances of survival of coral reefs is valuable,” said Simpson.

In 2015 and 2016, the world was able to listen to parts of the Great Barrier Reef struggle as high ocean temperatures bleached the coral, he explained. Such bleaching degrades reefs, leaves coral vulnerable to death, and can kill species that live within reefs’ complex structures.

“The reef went quiet. It was about a quarter as loud the following year because most of the animals making sounds were gone,” Simpson said.

Monitoring and reviving reefs through sound

Back in the Maldives, the team has used recording devices to monitor the recovery of some of the 60% of Maldivian reefs affected by coral bleaching in 2016, and to identify which might require support. Amid the arrival of El Niño, a climate pattern that drives up sea temperatures, it plans to do the same. Warmer ocean waters can cause coral to expel their symbiotic algae, and it doesn’t always come back. Coral needs algae to survive.

Having a catalogue of recordings of the local reefs will enable the team to see which areas are robust and which have been damaged. “If they are resilient to a bleaching event, we want to understand the bioacoustics of that reef. If we see reefs that are



Bleached coral on the Great Barrier Reef in 2017. The primary cause of mass bleaching events like this is heat stress from unusually high sea temperatures. (Image: Jurgen Freund / Alamy)

unfortunately hit more severely, then [we want] to see that slow recovery at that bioacoustic level,” Hodge said.

In the past, to assess damage to a reef, divers would have visually assessed it for short periods. Now, recordings can be gathered regardless of weather conditions, and around the clock, said Matthew Pine, a marine scientist and principal at the University of Victoria and at Styles Group Underwater Acoustics.

For those reefs that are damaged, interventions can be made.

Researchers can install underwater speakers to play healthy reef sounds to attract marine animals and revive the ecosystem. “We’re effectively calling the animals into those places that they’ll be safe, but they wouldn’t find without the added sound,” Simpson said. “That’s a process called acoustic enrichment, which allows us to be able to accelerate the rate of recovery.”

Another option for enhancing

recovery is to release coral bred in captivity back onto the reef.

A large proportion of coral larvae dies after fertilisation and when they’re trying to find their way back to the reef, Hodge explained. “So we’ve just done a pilot study where we took a small sample of spawn and we did ex-situ fertilisation. We settled them into a little tank and then planted it out on the reef.”

MUI is also talking to local authorities in Laamu Atoll about how to manage noise from boats and construction. Simply reducing boat speed or altering routes can give the natural acoustic world, and so ocean life, a better chance of functioning, Simpson said.

Beyond the Maldives

MUI isn’t the only organisation using sound to support the ocean and its inhabitants.



This recording of a fin whale has been sped up ten times to be audible to the human ear. It was recorded by the Ships, Whales and Acoustics in Gitga'at Territory (SWAG) project, an initiative of the Gitga'at Nation, North Coast Cetacean Society and WWF Canada. (Illustration: Kabini Amin / China Dialogue Ocean; Audio: WWF Canada)



Biologist William Schevill (left) listens to the sounds of a porpoise in 1955. Schevill was a pioneer of marine bioacoustics, making one of the first ever recordings of whale sounds in 1949. (Image © Woods Hole Oceanographic Institution)

Scan the QR code to watch on your phone or click the screenshot to watch on computer



The idea of bioacoustics has been around for a long time. It became more established as a field of research in the 1960s when improvements in recording devices opened up new opportunities for scientists.

In the 1990s, scientists began attaching radio devices to whales to record their sounds, as well as the depth and temperature of water they were swimming in. It allowed for the study of animal communication, including those that live in the deep ocean, Simpson said.

In recent years, marine bioacoustics work has “exploded exponentially” said Pine, mainly because of advances in technology.

This has allowed researchers to study the acoustics of ocean basins in the South Atlantic and North Pacific, to monitor Chinese white dolphins in Hong Kong, and study the attraction of larvae to reef sound.

More recently, bioacoustics are

becoming a critical conservation tool, helping to monitor the impact of climate change on underwater life.

“Passive acoustic monitoring is a really valuable and cost-effective tool for conservation management and to inform policy recommendations for populations at risk,” said Chris Johnson, the global lead for the WWF’s Protecting Whales and Dolphins Initiative.

“It can provide information such as distribution, abundance, population density, community composition, physiological state, changes in trends over areas or time, and can even be used as a proxy for measuring biodiversity richness,” he said.

Off the coast of California, WWF uses a combination of acoustics and mapping technology to predict the presence of blue and fin whales and to alert ships in order to prevent fatal collisions. In the Arctic, Wildlife Conservation Group Canada is monitoring beluga whales and

arctic cod to inform conservation policy. And in New Zealand, regulators are using bioacoustics to assess how much noise an infrastructure project would generate, to try and reduce the impact on animals.

The use of bioacoustics to measure coral reef health is a relatively recent innovation, Hodge said. Such work, Simpson said, is also being done in the Caribbean, Indonesia and Australia. But MUI, whose Laamu Atoll project began in December 2022, is the only organisation using bioacoustics to study reefs in the Maldives.

Looking ahead, Simpson said he hopes bioacoustics will play a significant role in protecting the world’s reefs and other ocean life. “I would love to see reefs in the degraded sites recovering, growing back faster in areas where we’re adding our new tools [such as acoustic enrichment],” he said. “I would hope to be going back to reefs and seeing the benefits of the research within five years.”

Can innovative insurance help protect coral reefs from climate change?

As coastal guardians scramble to save these valuable ecosystems, the emergence of parametric insurance products is releasing the necessary funds

A researcher at work in Puerto Morelos Reef National Park, Mexico (Image: Alamy)

Emma Bryce | September 27, 2023

On 7 October 2020, Mélina Soto hunkered down in the Mexican port town of Puerto Morelos as Hurricane Delta struck the coast she calls home at 110 miles per hour. “The sound of the wind is like a screaming, up high in the sky,” she says. “You hope for the best, but you prepare for the worst.”

Soto is the Mexico national coordinator for conservation initiative Healthy Reefs, so her mind was primarily on Puerto Morelos’ coral reef. Rich with towering elkhorn and violet fan corals, turtles and rays, this ecosystem is part of the Mesoamerican Barrier Reef: 1,000km of coral that curls along the coasts of Mexico, Belize, Guatemala, and Honduras. “Puerto Morelos is a small town. But we all depend on the reef” says Soto. Many residents are fishers, employed in marine tourism, or academics at the town’s coral research campus.

Once the storm had passed and work begun to patch up Puerto Morelos, Soto led a brigade of volunteer divers that took these efforts out to the corals, too. Bit by bit, they pieced together the storm-shattered reef. “It was like a triage” says Soto. Divers set about fixing 1,200 chunks of broken coral onto the reef with cement and ferried another 9,000 pieces to shore to be regrown in nurseries.

What made this possible was a flash of financial innovation. In 2019, Puerto Morelos’s home state of Quintana Roo purchased insurance to cover the reef, triggering emergency funding to repair it after a storm. It was a world-first. Now, similar insurance schemes are spreading to the Pacific, the Caribbean and the United States.

Increasingly, insurance is being considered a tool for securing natural capital against climate change. But as a wave of bleaching in 2023 affects global reefs, can this novel approach really protect corals against ever-warming seas?

Insurance products for a changing world

Worldwide, coral reefs provide ecosystem services to the value of \$2.7 trillion annually. This includes livelihoods and food for one billion people, and flood defences valued at \$1.8 billion, because reefs are natural breakwaters that can absorb 97% of wave energy before it hits the shore. Hurricanes threaten this role because they break reefs apart, coat them in sand and debris, and turn the water into a cloudy soup. These conditions block the sunlight that corals’ symbiotic algae need to photosynthesise and supply them with food.

Reefs have evolved to cope with hurricanes, but frequent battering gives corals less time to recover. “With climate change, there are more hurricanes, [they’re] more continuous and stronger,” says Maria del Carmen García-Rivas, director of the Puerto Morelos Reef National Park, a marine protected area that encompasses the reef. Pollution and warming seas heap further pressure on these embattled ecosystems.



Like with medical insurance, you need the hospital and the ambulance in order for it to work

Fernando Secaira
The Nature Conservancy

The idea that insurance could alleviate this strain first took hold in Quintana Roo in 2015, says Mike Beck. Back then, he helped pioneer this idea as the lead marine scientist for The Nature Conservancy (TNC). “All of it was completely novel” says Beck, who is now director of the Center on Coastal Climate Resilience at the University of California Santa Cruz. “On the conservation side, it was [a case of] look, at this point, we need any kind of help we can get with reefs.”

Beck and his TNC colleague Fernando Secaira began exploring parametric insurance: unlike traditional indemnity insurance, which necessitate loss assessments that delay claims, parametric insurance provides pre-agreed payouts that are immediately triggered by an agreed parameter, such as a specific wind speed. This rapid payment is a boon for hurricane-damaged reefs that can only survive a few days without help.

In 2016, TNC began work to determine what damage to expect from different wind speeds, which

helped them estimate the associated restoration costs. But they also needed the capacity to patch up the reefs: “Like with medical insurance, you need the hospital and the ambulance in order for it to work,” explains Secaira, who leads TNC’s climate risk and resilience efforts in Mexico. So, working with Mexico’s national park service and local researchers, TNC launched restoration training for volunteer divers in Quintana Roo. By 2018, this emergency ‘Guardians of the Reef’ brigade was ready to dive to the corals’ rescue.

Meanwhile, the cash for the insurance premium was raised by government and private-sector funding. The latter was collected via a tax on the beachside hotels that depend on the tourism that the reef underpins. In 2019, the state purchased a policy from insurance company Seguros Banorte and reinsurer Swiss Re. The policy covers 400km of coral, triggered by winds of 96 knots within 60km of the reef. In 2020, the first payout for almost \$800,000 was made.

Beyond Quintana Roo

Increasingly frequent hurricanes make these costs unsustainable for states to pay. Transferring this risk to insurance companies is therefore an

attractive option, while insurers benefit from the relatively high premiums.

However, these premiums can be reduced, explains Simon Young, the Climate and Resilience Hub’s senior director at insurance broker Willis Towers Watson (WTW). “If you’re looking at the probability of a certain wind speed, then the error bar on that is more limited,” he explains. “So, you can hold [insurers] much more to a price that reflects the risk than you can with more uncertainty.” The positive publicity linked to ecosystem insurance also gives insurance brokers leverage to negotiate favourable premiums, he adds.

Building on this success, a regional conservation funding institution called the MAR Fund purchased parametric insurance from AXA Climate in 2021, covering four Mesoamerican Reef locations in Mexico and Belize. Developed at the same time as the Quintana Roo scheme, the policy relies on a precise metric that categorises wind speed and reef proximity into distinct bands, each corresponding to a percentage of the payout. The insurance aggregates several reef sites under one policy, which has also helped secure favourable premiums, according to Claudia Ruiz, MAR Fund’s reef rescue initiative coordinator.

In 2022, the fund received its first payout of \$175,000 to repair hurricane



The Guardians of the Reef have been trained to patch back together coral reef damaged by storms in Quintana Roo, Mexico (Image: Con Con)

damage to Belizean reefs, following Hurricane Lisa. This year, the policy was renewed for the third time and expanded to cover 11 locations, now incorporating Guatemala and Honduras. “This is a very innovative programme,” Ruiz says. “It is working.”

A parametric insurance project for Hawaii was developed in 2022, while similar initiatives are being considered for the Pacific Islands and Indonesia.

These tools are also evolving to serve other ecosystems, like hurricane-hit mangroves in Mexico. WTW is currently exploring how tailored insurance products could “help support the mangroves themselves, but also the blue carbon that they are sequestering,” says Sarah Conway, director and head of WTW’s Ecosystem Resilience Practice.

Growing complexities

The nascent field has had some teething pains. For example, the 2020 payout to the state of Quintana Roo was held in a government gridlock for months before being released; TNC and others supplied interim cash to allow the time-sensitive restoration work to go ahead.

Meanwhile, the MAR Fund is trying to secure more sustainable funding streams for premiums: so far it has relied on grants from the UN Development Programme and others. “This programme cannot rely only on international cooperation funding” says Ruiz. Chip Cunliffe, the programme and risk director for the multi-sector finance initiative Ocean Risk and Resilience Action Alliance (ORRAA), is familiar with this problem: “Who is going to pay the premium? I think that’s always one of the big questions.”

However, these challenges are eclipsed by something much larger. This year, warming oceans have brought widespread reef bleaching, when heat-stressed corals eject their vibrantly hued, symbiotic algae. Caribbean reefs haven’t been spared. Speaking at the end of a day diving on the Puerto Morelos reef, García-Rivas,

director of the marine protected area, described an ecosystem sapped of colour: “The bleaching is terrible, there are a lot of dead corals. This is critical – I think it’s an emergency.”

Can coral insurance evolve to respond to bleaching? It’s a complicated picture. Compared to the clearer cause-and-effect of hurricanes, where damage can be predicted by wind speed and proximity to the reef, Soto says the parameters of a bleaching event and ocean acidification are more difficult to define. They vary widely in scale and impacts even across individual reefs, depending on species composition and general health. Warming may also bring added threats like acidification and disease. These factors increase the risk for insurance companies, which would likely be reflected in higher premiums.

The uncertainty of ocean heatwaves and bleaching also creates a conundrum for potential policyholders: what to spend the payout money on? Reefs smashed by waves can be pieced together and regrown. But bleached corals, while not necessarily dead yet, have lost a critical life partner in the algae, which may or may not return. Restoring this delicate relationship requires a set of complicated and ultimately uncontrollable conditions in the wild.

Incentives for risk reduction

There are some voices in the nascent parametric insurance field who think instruments could in fact be designed to help bleaching reefs – under specific circumstances. In 2022, AXA Climate developed a bleaching insurance product for a hotel in the Maldives that is propagating sapling corals offshore. AXA Climate’s nature initiatives lead, Ariane Kaploun, elaborates: “Here, what was interesting is that the insurable value was the money that they had engaged to plant these new baby corals into the nurseries.” The clearly defined nature of this coral project made it possible to cost the damage of potential bleaching, and with funding, fix it directly.

Ultimately, the hotel chose not to buy AXA’s policy, but Kaploun thinks it could become a blueprint for designing future insurance products. Furthermore, García-Rivas says insurance payouts could help fund research to identify the resilient corals that remain after a bleaching event and propagate those to genetically buffer reefs against climate change.

“We are still in the early days of understanding how all the pieces fit together, such that we could construct a product that there is an actual buyer of,” says WTW’s Conway. “But it’s an exciting area where there is, we think, a role for parametric insurance to play.”

The ultimate defence against acidifying oceans and bleaching reefs is to reduce global carbon emissions. In the meantime, at the ORRAA, Cunliffe believes parametric insurance is growing: “We’re now working with probably over 60 projects, and the majority of them have a finance or insurance link to them.”

Beck is hopeful that investments in reef conservation will be increasingly guided by estimates that reflect the full value that coastal ecosystems provide for fisheries and tourism, and as sea and climate defences. This could help build the case for protecting and restoring reefs preemptively before disasters hit. Beck suggests that insurance products could even be designed to offer premiums to policyholders who take this proactive approach: “When this really takes hold is when we’re offering different kinds of insurance-related incentives for the risk-reduction value of these [ecosystems].”

Back in Quintana Roo, it’s hurricane season. The dual threat of extreme weather and marine heatwaves has left reef rescuers like Méлина Soto desperate for solutions. “The bleaching is so intense that we will need more action,” she says. “We know that some of the corals that have been restored are bleached right now. That doesn’t mean they are dead: that’s why we are hoping for the best, that they might survive.” 🍷



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