

# Ocean solutions



**The Covid pandemic has made sustainable development more difficult and, as a result, the oceans more vulnerable than ever before. But there is hope in a range of solutions being drawn up or implemented around the world**



# FOREWORD

**T**he ocean covers 70% of the world's surface, and humanity relies on it to survive. It regulates temperature and climate by absorbing heat and carbon dioxide. It powers the water cycle, receiving water from rivers and releasing moisture into the atmosphere. It produces half of the world's oxygen, and almost 3 billion people rely on seafood as a source of protein.

Our poor handling of waste results in huge quantities of plastic litter ending up in the seas. A lot of this ends up returned to the land by typhoons, or clogging up fishers' nets, or breaks down into microplastics to be eaten by marine life and perhaps eventually human. We can no longer ignore this. If we don't limit plastic pollution at the source and remove existing plastic, then by 2050 the plastic in the ocean will weigh as much as the fish.

Meanwhile, overfishing means that, according to an FAO report, less than two-thirds of fisheries were still at sustainable levels as of 2017, and most of them are fully fished. As fisheries are exhausted, we will see fishers turn to other trades and the oceans stripped bare of fish.

In early August, the Intergovernmental Panel on Climate Change published the first part of its Sixth Assessment Report, finding that our biggest problem may be the complete loss of summer ice in the Arctic by 2050, due to global warming caused by carbon emissions. This would weaken the ocean currents vital for precipitation and ecologies almost everywhere, while associated sea

level rises will mean more frequent floods for low-lying coastal areas.

Meanwhile, our development of the coastlines and destruction of ecosystems such as mangrove swamp, seagrass meadows and coral reefs has reduced resilience to extreme storm surges.

To develop sustainably requires more effort, both in the international and domestic spheres, to ensure ocean sustainability. From national governments to individuals, we must all be part of the solution.

This journal looks at some of the work being done towards this end, including the UN's Decade of Ocean Science initiative, which aims to provide comprehensive scientific support for efforts to improve ocean health; the WTO's long-running talks to do away with fishing subsidies which encourage illegal and excessive fishing; the dozens of plans inventors have come up with to remove plastic litter from the oceans; and the international gathering and sharing of data on the ocean taking place some nations are pioneering, which will promote research and help us better understand the situation we are in, and how to improve it.

We hope to see more solutions to ocean issues, designed to solve the sustainability crisis and so create a more sustainable future for humanity itself.

**Zhang Chun**  
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*A Lithuanian super-trawler near Mauritania (Image: © Pierre Gleizes / Greenpeace)*

## POST COVID-19

# Ocean back in spotlight after Covid disruption

UN hosts high-level events on ocean conservation and illegal fishing, with a global deal to end harmful fishing subsidies expected soon

**Fermin Koop** | June 29, 2021

The world cannot afford to further delay action to protect the ocean, governments and conservationists agreed this month at a series of UN conferences. They called for “transformative” and actionable solutions following delays and cancellations caused by the pandemic last year.

The UN’s Sustainable Development Goal 14 (SDG 14) lists targets to reduce pollution, protect marine ecosystems, tackle illegal fishing and overfishing, and oversee sustainable resource use. But progress so far has been limited.

Only 8% of the ocean is currently protected, a third of fish stocks are overexploited, and climate change is increasing ocean acidification and deoxygenation. This not only threatens marine biodiversity, but also the livelihoods of millions of people who rely on ocean resources.

“Clear transformative actions to address the ocean crisis must be found and must be scaled up. Our relationship with our planet’s ocean must change,” Volkan Bozkir, president of the UN General Assembly, said at a high-level debate on the ocean and SDG 14 in New York on 1 June.

The event sought to maintain momentum ahead of the 2nd Ocean

conference, which was postponed due to the pandemic and is now expected to take place next year in Lisbon, Portugal. Bozkir said the pandemic revealed an “appetite for change” as people do not want to live in a world of “one crisis after the next.”

### Assessing progress

Speaking in four sessions, the panellists reflected on the progress made on SDG 14, six years after its introduction. Peter Thomson, UN secretary-general’s special envoy for the ocean, said progress has been more tangible compared to the “indifferent waters we sailed before SDG 14”. Still, he said, there is much more to be done.



Thomson called for a global plastic pollution treaty and a further expansion of marine protected areas (MPAs), with a goal of making at least 30% of the oceans protected by 2030. The target is set to be included in the new global biodiversity framework that countries are expected to agree on at the UN biodiversity conference in Kunming, China, in October this year.

Meeting it won't be possible without new MPAs being designated in Antarctica, Thomson added. Countries grouped under the Commission for the Conservation of Antarctic Living Resources (CCAMLR), which regulates the use of resources in the region, will meet in October this year to try and agree on three MPA proposals currently on the table.

Carlos Rodriguez, chief executive officer at the Global Environment Facility (GEF), said humans have a "social contract" for activities on land, with mandates for proper use, but that doesn't exist in the ocean. "We have to bring new ways of marine governance based on science," said Rodríguez.

For Achim Steiner, administrator of the UN Development Programme (UNDP), people "don't appreciate" the significance of the ocean, despite it producing "a lot of value" for the world. He called for a large investment in regeneration and restoration of the ocean, pursuing a marine blue economy with a balance between production (fishing) and protection.

### Action on fisheries

The summit also triggered discussions on the upcoming meeting of the World Trade Organisation (WTO) in July, which will seek to finally meet another key UN goal to eliminate harmful fishing subsidies. Subsidies paid to the global fishing industry that contribute to overcapacity or illegal fishing amount to around US\$35 billion every year. Countries have been negotiating an agreement for more than two decades without success.

Meanwhile, the world's fish populations have continued to fall below sustainable levels. Around



*A humpback whale off Half Moon Island, Antarctica  
(Image: © Abbie Trayler-Smith / Greenpeace)*

## What is IUU fishing?

Illegal, unreported and unregulated fishing (IUU) includes all fishing that breaks fisheries laws and regulations or occurs outside their reach.

60% of the assessed stocks are fully exploited and 30% are overexploited, according to the latest figures from the UN. The incoming director-general, Ngozi Okonjo-Iweala of Nigeria, has made the issue one of her top priorities.


For Yuvan Beejadhur, adviser to Okonjo-Iweala, an agreement is very close.

"Countries are working hard to have an agreement in July. We don't have more time," Beejadhur said. "The agreement will provide capacity support for developing countries and introduce a dispute settlement

body so countries can challenge decisions by other countries. There's no blue economy without sustainable development of fishing stocks."

Fisheries were also discussed at the Third Meeting of the Parties of the 2009 FAO Agreement on Port State Measures (PSMA). This is the first binding international agreement designed to prevent, deter and eliminate IUU fishing by stopping foreign vessels engaged in it from using ports and landing their catches.

So far, 69 parties, representing 56% of port states globally, have ratified the agreement. The director-general of the UN Food and Agriculture Organization (FAO), Qu Dongyu, said global action is making a difference in combating IUU fishing but more has to be done as consumer demand and catches continue to rise.

"Global fish production reached the highest levels ever, providing almost half the world's population with nearly 20% of their average animal protein. With this comes great responsibility to manage all aquatic foods sustainably and protect our oceans, rivers and lakes. Demand should be met by more sustainable supply from aquaculture," he said. 

# WTO inches closer to agreement on harmful fishing subsidies

Ministerial meeting could pave the way to a global agreement to ban subsidies that contribute to overfishing

Fermin Koop | July 27, 2021

After more than 20 years of negotiations, the World Trade Organization (WTO) has moved a step closer to an agreement on ending harmful fishing subsidies. The deal would set new rules for the global fishing industry and limit government funding that contributes to unsustainable fishing and the depletion of global fish stocks.

In a meeting with government ministers and heads of national delegations, WTO members vowed to finish the negotiations before the WTO's Twelfth Ministerial Conference (MC12) in late November, and to empower their delegations in Geneva to do so. Members also said the negotiating text currently on the table can be used as the basis to strike a final agreement.

"It's been a successful day," WTO chief Ngozi Okonjo-Iweala told reporters at the close of the meeting. "In 20 years of negotiations, this is the closest we have ever come towards reaching an outcome – a high-quality outcome that would contribute to building a sustainable blue economy. I feel new hope."

The talks' chair, Santiago Wills, was also upbeat: "I believe that the answers today have given us the ingredients to reach a successful conclusion. Members now want to move to text-based negotiations. Twenty years has been long enough. If we continue [negotiating] for another 20 years, there won't be any fish left."

Negotiators at the WTO had been tasked with eliminating subsidies for illegal, unreported and unregulated (IUU) fishing and prohibiting certain subsidies that contribute to overcapacity and overfishing. Talks



*More than 200 million people depend in some way on small-scale fisheries. Ending harmful fishery subsidies would give industrially overfished stocks an opportunity to bounce back. (Image © Chanklang Kanthong / Greenpeace)*



*If we continue  
[negotiating] for another  
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any fish left*

have been going on since 2001 but differences between governments have hindered progress.

2020 had been set as a deadline to strike an agreement, but talks were

delayed due to Covid-19 restrictions and the US presidential elections. A deadline was then set for this July, which was again missed. Now, Okonjo-Iweala, appointed as head of the WTO in March, aims to reach an agreement by year-end in what will be a key test for the organisation's credibility, with members deadlocked on other fronts.

"In international negotiations of this type only two things are relevant. The nitty-gritty to make sure everybody is on the same page, and the spirit that prevails. If Ngozi and Wills reflected correctly what happened in the meeting, we can say there's cautious optimism over an agreement," Remi Parmentier, director of environmental consultancy The Varda Group, told China Dialogue Ocean.



## A potential agreement

At the meeting, ministers discussed an eight-page draft agreement, which lists a range of subsidy bans and some conditions for exemptions for poorer countries, all of which are yet to be finalised. While some delegations like the EU were positive, several ministers expressed reservations over the content of the text.

“Clearly, it will lead to capacity constraints for developing countries, while advanced nations will continue to grant subsidies,” Indian trade minister Piyush Goyal said at the meeting, regarding one part of the text. Pakistan described the draft as “regressive and unbalanced,” while the African coalition said “significant gaps” remain.

Countries’ differences were acknowledged by Ngozi and Wills at the meeting. Nevertheless, they remain optimistic and said the issues would be resolved once countries move into text-based negotiations. The agreement on fishing subsidies will require a consensus among all member states, according to WTO rules.

The draft deal essentially proposes three categories of prohibited subsidies; those that support IUU fishing, affect overfished stocks, or lead to overcapacity and overfishing. While this may sound simple, the political, economic and cultural complexities represent real challenges.

One of the main issues has been the demand for developing countries and the poorest nations to receive so-called special and differential treatment. While this is widely accepted for the poorest countries, demands from self-identified developing countries to be exempt from subsidy constraints has proven to be difficult to accept.

Many of the major fishing nations are considered developing countries by the WTO, including China, which has one of the world’s biggest fishing fleets. China’s minister of commerce, Wang Wentao, expressed China’s “support for the conclusion of [fishing subsidies] negotiations before the end of MC12.” Speaking at the meeting on 15 July, Wang stressed that concluding the negotiations would represent a major contribution from the WTO to the United Nations’ 2030 Sustainable Development Goals.

“As a developing country and a major fishing power, China will take on obligations commensurate with our level of development”.

At the meeting, Wang also introduced China’s emphasis on green development in future policies on fishing subsidies and its “zero-tolerance” policy towards IUU.

Isabel Jarrett, manager of The Pew Charitable Trusts’ project to end harmful fisheries subsidies, told China Dialogue Ocean that an agreement “with too many loopholes” would undermine the WTO’s sustainability goals. The final text has to ensure that governments aren’t allowed to subsidise “irresponsible practices that can hurt fish populations,” she added.

## The scale of the problem

Subsidies paid to the global fishing industry amount to around US\$35 billion per year (228 billion yuan). Of this, \$20 billion is given in forms that enhance the capacity of large fishing fleets, such as fuel subsidies and tax exemption programmes, according to the European Parliament’s Committee on Fisheries.


In 2018, the world’s top 10 providers of harmful fisheries subsidies gave out \$15.4 billion in total, according to a report by Oceana. The EU, as a bloc, provided \$2 billion, ranking third behind China and Japan.

Research by Pew has found that

eliminating all harmful subsidies could help fish populations recover. Specifically, it would result in an increase of 12.5% in global fish biomass by 2050, which translates into nearly 35 million metric tonnes of fish – almost three times Africa’s entire fish consumption in a single year.

The need for progress on an agreement has gained new urgency during the last few years, as the world’s fish populations have continued to fall below sustainable levels. Around 60% of assessed stocks are fully exploited and 30% are overexploited, according to the latest figures from the UN Food and Agriculture Organization.

The termination of harmful subsidies, which is embedded in the UN Sustainable Development Goals (SDGs), would be seen as key progress on ocean sustainability ahead of this year’s UN biodiversity conference in Kunming, scheduled for October, and the COP26 climate summit in Glasgow in November.

“This is the year that the agreement has to be delivered. The WTO chief has made positive pronouncements of an agreement this year. There’s light at the end of this 20-year tunnel. The alternative of being in the tunnel shadows is a depressing prospect at the time ocean life is declining,” Peter Thomson, UN special envoy for the ocean, said in a recent webinar. 



*Women unloading the catch in Tanji, a fishing village in Gambia, West Africa (Image: Steve Lindridge / Alamy)*



*A school of bigeye scad off West Papua, Indonesia  
(Image: Steve Bloom / Alamy)*

POST COVID-19

# Can 14 nations put global ocean protection back on track?

Ambitious pledges made by members of the Ocean Panel were welcomed at the end of last year, but can they achieve their goals, and bring other nations on board?

**Olive Heffernan** | February 9, 2021

For ocean conservation, 2020 was a year of high hopes dashed. It had been billed as the year when world leaders would end harmful subsidies that drive overfishing, agree a new law to protect marine life beyond national waters, and edge closer to protecting 30% of ocean space by 2030. Instead, the world grappled with the fallout of Covid-19.

But amid the missed deadlines and postponed talks, a ray of hope emerged. In December, 14 nations who together oversee 30% of the

ocean's exclusive economic zones committed to managing their waters 100% sustainably by 2025. The plan, conceived by the High Level Panel for a Sustainable Ocean Economy, sets out a blueprint for restoring marine ecosystems globally, in a way that provides more food and jobs, benefits the economy and helps to mitigate climate change.

On 14 January, the panel launched its action plan in the US, calling on other ocean states – including the US – to sign up, and commit to 100% sustainable management of their

waters. As a way of encouraging others, the panel extended the completion date for new signatories to 2030.

“It’s a call to action... and not just to governments, but also to the private sector, financial institutions and civil society. It’s a rallying cry,” says marine ecologist Jane Lubchenco, who co-chaired the panel’s expert group, and previously served as administrator of the US National Oceanic and Atmospheric Administration under President Obama.

“The speed and urgency at which the ocean is changing requires a

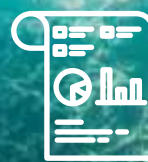




*The speed and urgency at which the ocean is changing requires a commensurate response*



**135**  
ORGANISATIONS



**19**  
PEER-REVIEWED REPORTS

*The Ocean Panel also sought counsel from more than 135 organisations across industry, finance and civil society. The result was a series of 19 peer-reviewed reports that cover in unprecedented detail the challenges facing today's ocean – from overfishing to plastic pollution – and the possibilities for its sustainable use, including drug discovery and renewable energy.*

commensurate response. While there are formal processes [to address ocean issues], we need an additional process," says Kristian Teleki, head of the Secretariat for the High Level Panel.

The 14 nations that have agreed the deal so far are Australia, Canada, Chile, Fiji, Ghana, Indonesia, Jamaica, Japan, Kenya, Mexico, Namibia, Norway, Palau and Portugal. A motley crew, of which some – such as Norway and Palau – boast successful ocean economies, while others – such as Ghana and Jamaica – are struggling with severely depleted fish stocks. Yet

all have citizens who rely heavily on the sea for food and income, and are facing the pressing need to balance these demands with environmental protection.

"The ocean divides these countries but it also unites them. They each face different challenges but are connected by the plight of their people, whether that's their finances or their wellbeing," says Teleki.

In 2018, they formed the High Level Panel as a way of redressing humanity's ailing relationship with the ocean. What followed was a two-year process

of gathering data and knowledge from 250 global ocean experts – in 48 separate countries and regions. The panel also sought counsel from more than 135 organisations across industry, finance and civil society. The result was a series of 19 peer-reviewed reports that cover in unprecedented detail the challenges facing today's ocean – from overfishing to plastic pollution – and the possibilities for its sustainable use – including drug discovery and renewable energy.

Informed by this evidence, the 14 nations committed to major



transformations in five key areas: seafood production, climate mitigation, biodiversity protection, and integrated management, aided by huge investment in the ocean economy. Applied globally, these efforts could, by 2050, give us six times more seafood, 12 million more jobs and 40 times more renewable energy, add US\$15.5 trillion to the economy and deliver 20% of the emission reductions needed to limit warming to 1.5C above pre-industrial levels.

“They have gathered this incredibly rich resource of material to guide the decision-making process,” says Dana Miller, a senior policy advisor with non-profit Oceana, and an author of the panel’s report on ocean finance. “There is an enormous opportunity here,” she says, “for these leading countries to really transform the way our ocean is considered, valued and used, both now and into the future.”

But while the plan sounds ambitious, it’s “not about some future nirvana”, says Torsten Thiele, an ocean governance specialist who served as one of the panel’s expert advisors. Thiele says that nations have already signed up to many of these obligations elsewhere. The new plan is about how these goals can be achieved, and how they’ll be financed.

### A crisis on many levels

The ocean faces a growing crisis: more than 90% of commercial fish stocks are fully exploited or overexploited; waters are warming and acidifying due to climate change; and ocean pollution is at an all-time high. “The state of the ocean is parlous. To be completely frank, it’s much worse than a lot of people think,” says Dan Laffoley, an ocean conservation expert with the International Union for the Conservation of Nature.

Right now, ocean governance is a patchwork of rules and regulations. Plans to mine the seabed for minerals, for instance, may fail to take into account efforts to restore wild fish populations. Coastal waters are the responsibility of nation states, and are typically managed sector by sector. Their adequate protection is crucial because



Wooden fishing boats at Elmina port. The decline in Ghana’s fish stocks is putting livelihoods and food security at risk. (Image: EJF)



*To make a dent in IUU fishing... additional key countries would need to commit, especially those with large distant-water fishing fleets*

they contain 90% of ocean biodiversity and are where most of the economic activity takes place.

Central to the panel’s vision is a plan to derive more food from the sea to meet growing global demand for protein and nutrients. With the right investments, the ocean could deliver 36–74% higher food yields by 2050. But first, nations will have to end overfishing and replenish wild stocks, goals that already exist internationally.

So what exactly have these nations signed up to? Will others do the same? And who will hold them accountable?

### Ending subsidies and illegal fishing

Currently, all major fishing nations have an opportunity to end harmful fisheries subsidies through a deal being negotiated by the World Trade

Organization (WTO). These subsidies drive overfishing by, for instance, covering fuel costs or financing the construction of larger boats. The deal, which was due to be finalised last year, has been delayed by Covid-19. The 14 members of the High Level Panel are now leading the charge by agreeing to end this practice in their nations unilaterally.

“While reform by these individual countries is positive, ultimately, we want to see it at a much bigger scale,” says Isabel Jarrett, a fisheries reform campaign manager at the Pew Charitable Trusts in Washington DC. “We would still like those countries to come to the table at WTO and push for a multilateral agreement,” she says.

Another, separate, commitment from the panel is to stop illegal,



unreported and unregulated (IUU) fishing. Internationally, the Port State Measures Agreement targets IUU fishing by giving nations the authority to refuse port access to fishers engaged in illicit activity, such as poaching or intentionally undervaluing their catch. Not all nations have signed on. While the panel's commitment to end IUU is welcome, will it make a difference?

Miller is concerned that "the actions proposed to achieve this are not very concrete." She would like to see nations push for greater transparency by requiring their fleets to carry publicly accessible vessel-tracking technology or mandating the use of international registration numbers, for example.

"If they were to commit to these types of concrete measures, I am confident that it would make a dent in IUU fishing. But to do this on a global scale, additional key countries would need to also commit, especially those that have a role as flag, port processing and market states, and those with large distant-water fishing fleets such as China, Taiwan and Spain."

### Protecting and restoring ecosystems

The High Level Panel has also committed to restoring and preventing the degradation of "blue carbon" ecosystems – the mangrove forests,

seagrass meadows and salt marshes that are the ocean equivalent of rainforests. Coastal marine ecosystems have carbon sequestration rates up to 10 times higher than land ecosystems, and yet we've lost an estimated 20-50% of them globally. To reverse this trend, and the destruction of marine ecosystems more generally, nations will need to safeguard them within marine protected areas (MPAs).

Currently, just 2.6% of the global ocean is strictly protected, meaning off limits to industrial extraction. Scientists advise that at least 30% of the ocean needs to be placed within strict MPAs by 2030, if we're to stem the loss of marine life. The High Level Panel supports this goal, but how they'll scale up actions to achieve it is unclear.

"We had a target to protect 10% of the ocean by 2020, and we haven't reached it," says Peter Jones, a marine planning and governance expert at University College London, who argues that it's important to focus on how MPAs work, and whether they are effective and equitable, rather than simply focusing on numeric targets. Others, including Laffoley, argue that the 30% target doesn't go far enough, given the continued decline of ocean health, and that we should be looking to exclude industry from at least 50% of ocean space. "We need to go much further, much more quickly," he says.

Elsewhere, the UN is negotiating a deal that would protect marine life in the high seas – those waters beyond national jurisdiction – and handle many of the same issues, such as establishing MPAs, offshore. Much like the WTO talks on fisheries subsidies, these negotiations have been delayed by the pandemic, and are due to reconvene in August.

Thiele cautions against seeing the new deal as an alternative to these ongoing international processes. "This is just another part of the puzzle. These processes should be nicely complementary," he says.

### Converting words into actions

Unlike many of the formal negotiations taking place on ocean

issues, the commitments of the High Level Panel are voluntary and non-prescriptive. Describing it as "a healthy competition", Teleki says that the aspiration is for nations to lead by example, showing others that ocean restoration can be regenerative. Signatory nations will update the panel regularly on their progress, with the first report due in September 2021.

Whether the panel's vision for ocean recovery can be achieved will ultimately depend on whether it can garner political and financial support. As a starting point, the panel members would like to see nations direct a chunk of their Covid-19 stimulus packages toward a "blue" ocean-centred economic recovery plan. Writing in *Nature*, Lubchenco and others note that following the 2008–09 global fiscal crisis, each \$1 million invested in ocean recovery in the US created an average of 17 jobs – more than twice those created for each dollar invested in road construction and fossil-fuel exploration and extraction combined.

Another hope, says Thiele, is that institutions such as the EU and the UN will understand that ocean restoration can help to solve the climate problem and direct their climate funds accordingly. "The UN green climate fund will have to be an ocean fund; otherwise we'll continue to destroy the ocean," he says.

Landmark events in 2021, including UN conferences on the ocean, climate and biodiversity, could help garner support for the panel's action plan. Getting the US to sign the deal – a possibility with Joe Biden now in office – would also rally support. "It all depends on where the money goes, and big decisions will be made in 2021," says Thiele.

Teleki sees the agreement itself as a "blue silver lining" of 2020. "Despite everything that's gone on in the last year, heads of states and their ministers still managed to work to put together an ocean action agenda", says Teleki. "Converting those words into action will be the real necessity over the coming years and decades," he says. 🌊



*A sea cucumber in a seagrass meadow off Komodo, Indonesia  
(Image: Ethan Daniels / Alamy)*

# Can Joe Biden kick-start stalled progress on ocean conservation?

The US president has announced a raft of positive marine measures and appointments, but must work with China to make a breakthrough on subsidies, the high seas and Antarctic protection

Todd Woody | June 9, 2021

In the opening months of President Joe Biden's administration there has been a sea change in ocean policy as the United States moves to re-engage with the international community to tackle climate change.

This engagement could have significant consequences for a host of marine issues, from harmful fishing subsidies and a high seas biodiversity treaty, to efforts to create marine protected areas (MPAs) in Antarctica. To achieve progress, though, observers say the Biden administration must work with China, given the country's influence on ocean policy.

"China is working on climate change, they participated in the Biden summit

on that, and so it seems like they're really interested in engaging in these multilateral forums on ocean issues," said Andrea Kavanagh, project director for the Pew Charitable Trusts' Protecting Antarctica's Southern Ocean initiative.

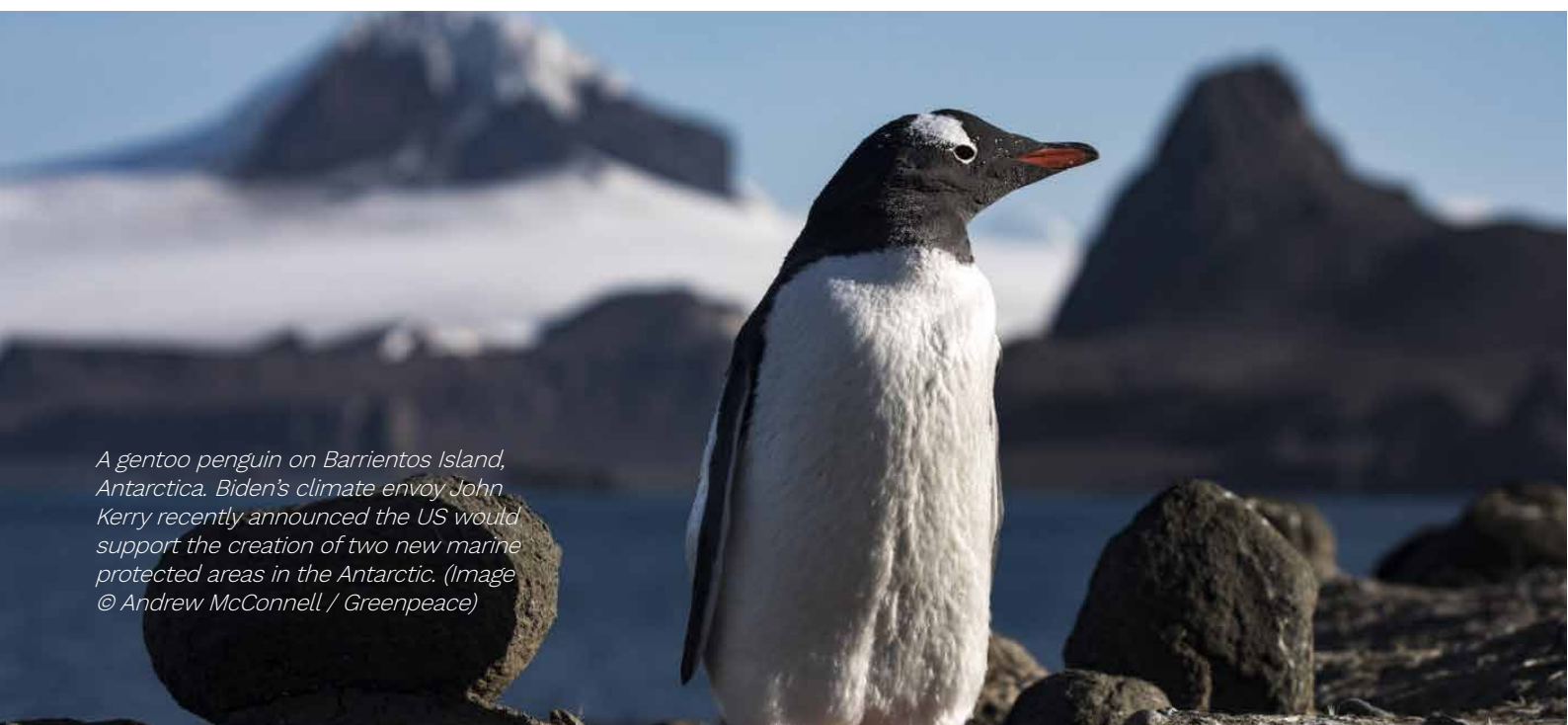
The details of many Biden policies remain to be announced. But the administration has signalled its strong support of ocean issues by appointing respected scientists and environmentalists to key positions at agencies such as the National Oceanic and Atmospheric Administration (NOAA), which had been demoralised, defunded and politicised under the previous president, Donald Trump.

Biden, for instance, has proposed a record US\$6.9 billion budget for NOAA (a 26% increase on the previous year)

and has nominated a former top NOAA scientist, oceanographer Rick Spinrad, to run the agency. John Kerry, the administration's climate envoy, founded the Our Ocean conference when he served as secretary of state in the Barack Obama administration. Marine ecologist Jane Lubchenco, who has become the deputy director for climate and environment at the White House Office of Science and Technology Policy, served as NOAA's chief under Obama.

The Biden administration has pledged to protect 30% of US land and waters by 2030. In May, it tried to globalise that "30x30" commitment when it joined a communiqué issued by G7 nations calling for protection of 30% of the world's oceans, also by 2030.

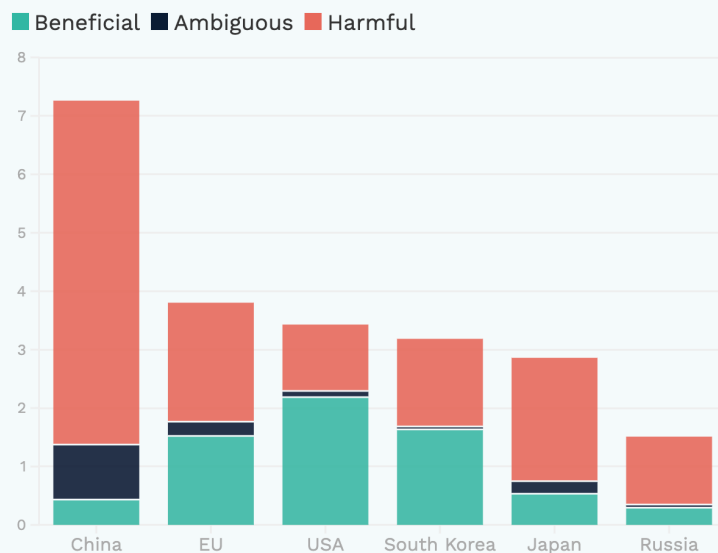
The communiqué committed the



*A gentoo penguin on Barrientos Island, Antarctica. Biden's climate envoy John Kerry recently announced the US would support the creation of two new marine protected areas in the Antarctic. (Image © Andrew McConnell / Greenpeace)*



## Top countries/blocs by fishing subsidies in 2018 (US\$ billions)



Source: [A global dataset on subsidies to the fisheries sector, Data in Brief, 2019](#)

nations to work toward concluding negotiations over a high seas biodiversity treaty by the end of 2021 and supported efforts to expand a network of marine protected areas in Antarctica.

While the Covid-19 pandemic has significantly slowed international negotiations, 2021 could prove a pivotal year to finalise long-running talks on damaging fishing subsidies, the high seas biodiversity treaty and the creation of vast new marine protected areas in Antarctica.

### Fisheries subsidies

For two decades, the World Trade Organisation (WTO) has attempted to reach an agreement by its 164 member states to ban harmful fisheries subsidies that promote overfishing and illegal, unreported and unregulated (IUU) fishing.

During that time, China's overseas fishing fleet has expanded and become the world's largest, at nearly 3,000 vessels. Researchers in 2016 determined that US\$20 billion of US\$35 billion in annual global fisheries subsidies were harmful. The result: one-third of fish species are being harvested at biologically unsustainable levels, according to the United Nations Food and Agriculture Organisation.

Rashid Sumaila, a University of British Columbia fisheries expert and close observer of the WTO, is optimistic that a deal may finally be in sight – for two reasons. One is that the new director-general, Ngozi Okonjo-Iweala of Nigeria, has made fisheries subsidies a priority. She is convening a ministerial conference in July with the aim of finalising negotiations. The other reason is the new environmentally friendly US administration.

“Hopefully, these two recent events might just help the WTO and the world get the job done after 20 years of trying,” he said. “That would be a big win for marine biodiversity, fish and fishers who want to fish sustainably.”

The Biden administration's specific stance on the negotiations remains to be seen. “So far the administration has been focusing on climate change and have not said much about the WTO negotiation on fisheries subsidies,” noted Sumaila, adding that it “seems to be holding to the US position that the country wants an ambitious agreement. I hope they are pushing for this behind the scenes.”

Cooperation between China and the US, two of the biggest subsidisers, is key to breaking the stalemate at the WTO, according to Sumaila. For years,

negotiations have been hampered by disagreements over whether developing countries would be given more time to phase out subsidies. WTO member states are allowed to declare themselves as developing nations, as China has done.

“One single action that would help is for the US to work with China and come up with a joint communiqué stating that the nations will support reaching an agreement at the upcoming WTO Ministerial [conference],” he said. “I think such an agreement between the US and China would incentivise other countries to sign on.”

### Antarctic marine protection

Antarctica is one of the regions most impacted by climate change and fishing. It's also where the international community, even at its most divided, has come together to protect the continent's unique biodiversity. At the height of the Cold War in 1959, the US, Soviet Union and 10 other countries signed the Antarctica Treaty, committing the parties to peaceful exploration.

An international convention established the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) in 1982. CCAMLR currently has 26 member states, including China and the US. The parties' approval of the 1.57 million km<sup>2</sup> Ross Sea marine protected area, which came into effect in 2017 and banned commercial fishing for 35 years, created the world's largest MPA.

It was to be part of a network of protected zones to limit the effects of climate change and a burgeoning krill fishing industry. Krill, a small crustacean, is considered a “keystone” species because it converts energy from the sun – by eating single-celled plants called phytoplankton – into food for larger marine species including penguins and whales. Commercial fishing turns hundreds of thousands of tonnes of krill into fish meal to feed farmed fish and pets, as well as krill oil for human health supplements.

Krill populations are also being affected by climate change, with temperatures in Antarctica rising three

times faster than the global average, a 2020 study found.

However, efforts to address these two threats through the establishment of three additional MPAs – in East Antarctica, the Weddell Sea, and around the Antarctic Peninsula – have foundered in recent years, largely due to objections from China and Russia. China deploys a krill fishing fleet in the Southern Ocean and Russia has taken steps to establish its own krill fishery. Other nations fishing for krill in the past decade include Norway, South Korea, Japan, Chile, Poland and Ukraine. A proposed MPA requires unanimous approval by member states.

Efforts to break the impasse received a boost in April when Kerry announced the US would join other CCAMLR states to press for the approval of the East Antarctica and Weddell Sea MPAs. The proposed Antarctica Peninsula MPA is still being evaluated by CCAMLR's scientific committee.

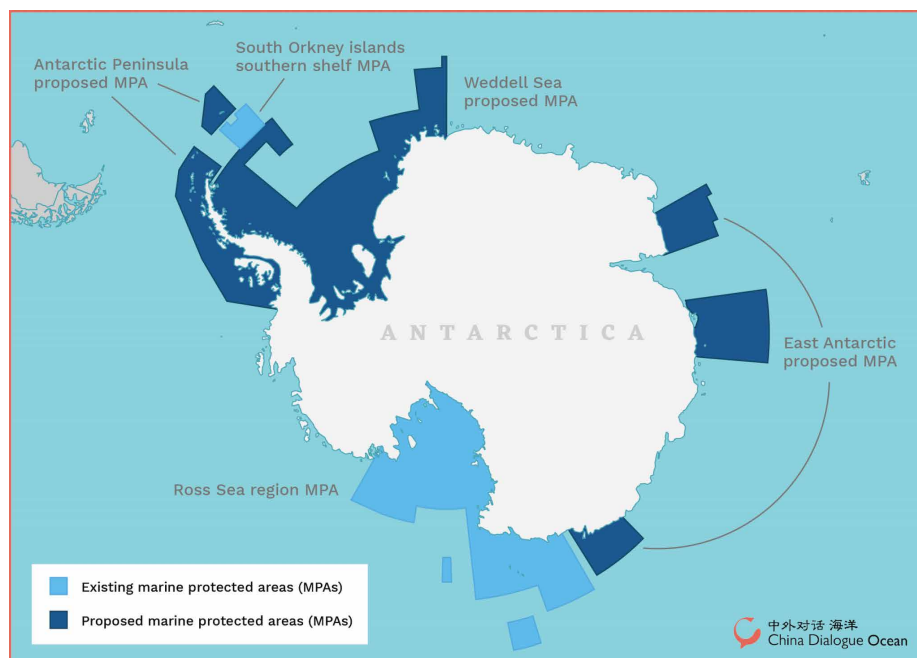
"The US coming on as an official co-sponsor is great news," said Kavanagh of the Pew Charitable Trusts. "It's just showing that there's this global push and a global awareness that we need to have these protections."

She noted that negotiations over the Ross Sea MPA dragged on for years until a group of nations coordinated a campaign to persuade China and Russia to sign off on it. "Obama himself got involved, especially when talking with China," said Kavanagh.

She said a similar approach is needed to reach consensus on the East Antarctica and Weddell Sea MPAs. Kerry's involvement is an encouraging sign, given his former position as secretary of state and his experience in negotiating with China.

"John Kerry in his role as the climate envoy knows how important MPAs are to provide resilience against climate change," said Kavanagh.

Prospects for face-to-face negotiations, however, look dim. CCAMLR is headquartered in Tasmania, Australia, where its annual meeting is held. But in May, the Australian government announced it would keep its borders closed to



international visitors until mid-2022.

"It's just tough because in the virtual meetings you don't have as much time for negotiations because of time differences," Kavanagh said. "And you don't have any of the hallway meetings or the receptions and dinners where most of the work gets done."

### High seas biodiversity treaty

In early March 2020, Kerry helped facilitate a "High Seas Treaty Dialogue" with government leaders in Monaco. The event highlighted issues to be taken up three weeks later at the United Nations when delegates were to convene for what was to be a final session to complete a landmark treaty to protect biodiversity on the high seas.

Among other provisions, the treaty would allow for the creation of marine protected areas in the 58% of the ocean that lies beyond national jurisdiction, provide for the sharing of marine genetic resources among nations and require environmental impact assessments for certain high seas activities.

There was little consensus, though, on the specific terms of those provisions or how they would be implemented as delegates prepared to gather in New York last year. Then, days before negotiations were to begin,

the United Nations and the rest of New York City went into lockdown as the pandemic spread.


With in-person negotiations postponed, delegates began meeting virtually in monthly video sessions, according to Peggy Kalas, coordinator of the High Seas Alliance, a coalition of major environmental groups founded in 2011 to advocate for a high seas biodiversity treaty. The talks are informal, which means they don't carry the weight of formal negotiations.

Kalas said it's too early to know how the Biden administration's environmental policies will affect the treaty negotiations, noting that ocean-related senior positions in the US State Department remain vacant.

But observers view Kerry's interest in the high seas biodiversity treaty as promising.

"We're hoping that we can perhaps get Kerry to engage" in treaty negotiations, Kalas said.

In-person negotiations currently are set to resume in August, though some observers expect talks to be postponed as other UN negotiations have been recently. In that event, virtual discussions will likely continue.

"We are all very exceedingly Zoomed out," said Kalas. 



# The ocean in China's 14th Five Year Plan

The FYP has a standalone section on the ocean that for the first time includes the word sustainable in relation to distant-water fishing, and suggests China's environmental ideas will be extended overseas.



*Fishing boats sitting in the harbour of Beijiao Village, southeast China's Fujian Province in May 2020. The summer fishing ban is part of China's efforts to promote sustainable marine fishery development and improve marine ecology (Image: Jiang Kehong / Alamy)*

Jiang Yifan, Shi Yi | April 8, 2021

In mid-March, Beijing was enveloped in heavy smog for most of this year's crucial Two Sessions meetings of China's top legislators, during which the 14<sup>th</sup> Five Year Plan for economic and social development was approved. With this being the first FYP published since China committed to carbon neutrality, its climate and energy targets received the lion's share of international attention. But the ocean also has far-reaching

implications for international relations and governing the global commons. And the chapter on it in this year's FYP contains language suggesting the extension of China's environmental ideas overseas.

"Harmony between humanity and the ocean, win-win cooperation, and pushing forward with conservation of ocean ecologies," were mentioned in the chapter introduction. This contrasts with the 13<sup>th</sup> FYP, where the language focused on developing the ocean economy and ocean resources. One

## Editor's note

This is an edited excerpt from a [broader analysis](#) by Jiang Yifan on what China's 14th Five Year Plan means for the environment.

notable change in this year's document is the call for "sustainable distant-water fishing" (DWF) – the word "sustainable" was missing five years ago.

The development of DWF was first mentioned in the 12<sup>th</sup> FYP, published in 2011, and the country's capacity has increased rapidly ever since, now far outstripping all other countries. China's DWF fleet operates in the waters of 40 countries and regions, and on the high seas of the Pacific, Indian and Atlantic oceans, as well as in Antarctic waters.

Illegal, unreported and unregulated (IUU) fishing by Chinese vessels has become a matter of international concern. Last year, China announced its first self-imposed moratorium on some high seas fishing, but how it will make this sector "sustainable" next is anyone's guess. A 14<sup>th</sup> FYP document specific to the fishing industry, currently being drafted, is expected to provide more answers.

When it comes to international relations, there has been a shift from "protecting [China's] ocean rights" in the 13<sup>th</sup> FYP to a more active "in-depth participation in global ocean governance", promoting the establishment of a "fair and reasonable international ocean regime" and the development of "blue partnerships" and an "ocean community with a shared future for mankind." According to Liu Nengye, director of the Centre for Environmental Law at Macquarie University, "China used to focus on cooperation with littoral [coastal] states, but as its capabilities in ocean industries such as ship-making and distant-water fishing have expanded, it has acquired the ability and experience to participate in the setting of international rules. The change in language could be seen as an intensification of the 'marine world power' strategy."

On polar governance, the 14<sup>th</sup> FYP Outline also proposes an "Ice Silk Road" shipping route in the Arctic, alongside increasing capacities to participate in governance and utilisation of the Antarctic. In 2017, China hosted Antarctic Treaty talks for the first time, and in 2018 published a white paper on the Arctic, which Liu regards as landmark for China's involvement in polar governance. He says that while there are international



*Transshipment: frozen tuna are passed from one boat to another in the middle of the Atlantic (Image © Tommy Trenchard / Greenpeace)*



### *China has acquired the ability and experience to participate in the setting of international rules*


calls for protection of the poles, and in particular the Antarctic, China stresses a balance between protection and utilisation, and he sees the language in the 14<sup>th</sup> FYP Outline as a steady continuation of China's polar policy.

When it comes to governance of the ocean environment, the Outline calls for more cooperation with other coastal states on monitoring, protection and research, and better study and assessment of strategic deep-sea resources and biodiversity.

Meanwhile, at home, China will bolster controls of land-source ocean pollution, with river basins, river mouths and coastal waters to come under unified management with a so-called "land-sea coordination"

approach, and the scope of caps on land-source pollutants to be expanded to ensure river water quality. Ultimately, this work needs to be reflected in improvements to coastal environments and ecologies, and in five years the Ministry of Ecology and Environment will assess progress as part of a national "Beautiful Bays" campaign. This will look at water quality, as well as the recovery of marine life and habitats and the protection and restoration of natural coastlines.

According to the ministry, the Beautiful Bays campaign will feature as a target in the special 14<sup>th</sup> FYP for ocean environmental protection – the first such document to be drafted – with all 1,467 of China's ocean bays to be certified by 2035. Improving the environment in Chinese waters is also of benefit to the global ocean.

Expert analysis says compared to the 13<sup>th</sup> FYP, the new plan signals a shift from focusing on domestic marine governance to constructing an "ocean community with a shared future for mankind". In the coming five years, the progress of this shift will be closely watched from across the world. 



# What is the UN decade of ocean science hoping to achieve?

Disruption caused by the pandemic makes it unlikely the WTO will reach an agreement to end harmful subsidies this year

David Adam | November 13, 2020

Next year marks the beginning of what the United Nations hopes will be a pivotal decade for the global ocean. The UN is mounting a massive operation to try to raise awareness of the many problems it faces, and to harness the scientific research needed to solve them.

Called the UN Decade of Ocean Science for Sustainable Development, the campaign has been in the planning stages for some time. Much remains to be finalised – not least the formal choice of which specific issues to address, and finding ways to do so. But last month,

the project kicked off by publishing its first call for ideas for programmes, projects or activities that could be carried out under its banner.

The project's motto is "The science we need for the ocean we want". By 2030, the UN expects the world to have more of both. But what exactly will the ten-year campaign do – and how?

The person best-placed to answer that question is Vladimir Ryabinin, a Russian marine scientist who serves as executive secretary of the IOC. That's not the International Olympic Committee, as Ryabinin feels duty-bound to tell people, but the lesser-

known International Oceanographic Commission. It's part of UNESCO, the arm of the UN that handles education, science and culture.

"Basically the ocean is in big trouble," Ryabinin tells China Dialogue Ocean. "The only ocean we can afford to have in the future is one that is scientifically managed. Historically, science has been based on curiosity and discovery. Now the world needs science that is oriented and practical and focused on solutions."

The blueprint for the project starts with how it wants to finish. By 2030, the organisers want to have made possible significant progress towards:



*Running entirely on renewable energy, this solar-powered ocean drone can travel for months at a time collecting ocean data (Image: Open Ocean Robotics)*

- identifying and removing sources of ocean pollution
- mapping and protecting marine ecosystems
- ensuring the ocean is harvested in a sustainable way
- protecting people from ocean hazards
- building capacity to understand and predict ocean conditions
- opening up access to ocean data and technologies

Much of this will be made possible, the UN says, by investment in open sources of data, information and technology.

“The scale is huge but it’s a once-in-a-lifetime opportunity. It’s probably the largest campaign in the history of natural sciences or social sciences,” Ryabinin says.

He has been trying to drum up support for the idea – and funding. On 16 October, for example, he presented details on how the project could help promote better global ocean governance at a meeting in Shenzhen, China. Called the International Cooperation and Development Forum on Marine Economy 2020, the event was focused on the 65% of the surface of the oceans that are beyond the reach of national systems of governance and surveillance. These regions of the high seas are rich in biodiversity and



*Historically, science has been based on curiosity and discovery. Now the world needs science that is oriented and practical and focused on solutions*

#### **Vladimir Ryabinin,**

a Russian marine scientist who serves as executive secretary of the IOC



*Measuring ocean temperature in the Arctic, September 2020  
(Image © Daniella Zalcman / Greenpeace)*


resources and play a critical role in oxygen production and carbon storage. Yet they are subject to overexploitation, pollution and degradation.

One way to manage and conserve these international waters is to set up marine protected areas, Ryabinin says. To establish more such zones is one of the explicit goals of the UN’s decade project. Others include early warning systems for tsunamis, coast and fisheries management, and better planning systems to encourage aspects of the “blue economy” such as offshore wind power generation. Other important aspects of the project are to boost and build national capacity in countries that have not traditionally prioritised ocean management – allowing them to develop national research strategies and ocean policies.

Ryabinin says the job of the project organisers is to set the framework, and then rely on scientists, policymakers and other experts around the world to lay out the best routes to achieving the desired progress.

One idea from scientists, for example, is a massive expansion in the routine, long-term monitoring of the oceans. Called the Global Ocean Observing System, such a scheme would use autonomous submarines, smart floats and research cruises to constantly track physical, chemical, biological and ecological ocean properties – from basics like temperature to sophisticated analyses of fish stocks.

Writing in the journal *One Earth* earlier this year, marine scientists from around the world said the UN decade project offered “an unprecedented opportunity for the international ocean science community to organise itself and create the needed synergies, partnerships, connections and interfaces to support policy and action with science and knowledge.”

The scientists added: “It is imperative we get to the end of the Decade with a new way of carrying out marine science.” 



*In the Bohai Sea, offshore aquaculture like this has been encouraged as a more environmental alternative to coastal aquaculture (Image: Liu Yuyang / China Dialogue)*



## OCEAN SOLUTIONS

# A healthy ocean is key to China's ecological civilisation

The co-chairs of a special policy study, on how China can manage the ocean to balance protection and production, share their findings

**Jan-Gunnar Winther, Su Jilan**

October 29, 2020

The ocean is fundamentally important for humankind and vital for the world's economic development. Globally, ocean-based industries are critical providers of employment and income for three billion people. The ocean also holds the potential for the future development of new and expanded industries.

A healthy ocean environment is a prerequisite for drawing on these benefits. It is disturbing that the global ocean is facing growing threats, in particular global warming and acidification under ever-increasing atmospheric carbon dioxide, and overexploitation of natural marine resources.

How to develop a sustainable ocean economy is now discussed at the highest level, at the United Nations, G7, World

## What is CCICED?

The CCICED was founded in 1992 as a high-level international advisory body with the approval of the government of China. By championing sustainable development, it has built a bridge between China and the international community on environment and development. A platform of exchange, it has enabled the international community to understand China and support China's engagement with the world.

Economic Forum and in boardrooms around the world.

In 2017, the China Council for

International Cooperation on the Environment and Development (CCICED) initiated a special policy study with several aims: to identify ocean and coastal issues of priority interest to China, to map relevant ongoing national and international ocean initiatives and undertakings, to suggest how China could complement and contribute to these efforts, and to recommend areas that could be relevant for China to take leadership on. The study – Global Ocean Governance and Ecological Civilization: building a sustainable ocean economy for China – involved an extensive group of experts from China and beyond.

More than half of China's population now resides along the coast, where 60% of its national GDP is produced. More importantly, the recent rapid development of China's economy and social wellbeing was initiated in the coastal cities. Currently, China's key ocean-based industries are tourism, fisheries (both capture and mariculture), shipbuilding and shipping, offshore oil and gas, and building of infrastructure such as bridges and tunnels. Renewable ocean energy and seabed mining, as well as ocean-based biotechnology, are emerging as potential and likely future large-scale industries. In many of these sectors, China is a world leader in terms of the scale of its industry, and as such, contributes to setting global standards.

At the same time, China, like many other coastal nations, is facing the reality of seeing its coastal seas declining

in quality, caused by increasing discharge of terrestrial pollutants, land reclamation, overfishing, and pollutants from mariculture. The nature of the ocean ecosystem is both fragile, highly dynamic, and interconnected at all scales. Therefore, there is a need to manage and govern the ocean with an ecosystem-based integrated approach to strike a balance between protection and production.

### Recommendations for the 14th Five Year Plan

The policy study is now completed. The timing is rather opportune, because this year China will finalise its 14th Five Year Plan (FYP), laying out its socio-economic development blueprint for 2021-2025.

Our study recommends that the effort laid out in the 13th FYP on strengthening the ocean economy shall continue in the 14th FYP, and more importantly, clearly bring into the framework of “Beautiful China” the importance of the ocean environment as the basis of life on Earth.

We emphasise that the ocean environment will undergo substantial


change due to both climate change and the growth of new and innovative ocean industries. The scale and scope of these changes challenge current management regimes. There is, therefore, an essential and urgent need for China to develop integrated ecosystem-based management frameworks that capture this dynamic development in nature and ocean economies. We also suggest that China can take international leadership on issues and actions supporting sustainable ocean industries, both ongoing and emergent, and promote international cooperation in matters relating to sustainable ocean management.

In the report, we encourage China to support the use and development of green technologies that support all its ocean-based industries. To secure the use of best available knowledge, we recommend establishing a formal mechanism at the national level, such as a scientific advisory body, to underpin coordinated and holistic use of knowledge in instituting overarching policies on the development of a sustainable ocean economy.

Because of the highly dynamic

nature of the marine ecosystems, we also recommend setting up organisational structures/bodies, guidance and legal frameworks that enable cross-boundary (administrative and land-ocean connectivity) and cross-sectoral coordination and communication, both on and between national, regional and local levels. Specifically, it is recommended to establish a coordination mechanism across relevant government ministries to support the development of policies fostering and underpinning ecosystem-based integrated ocean management in China.

Last but not least, we suggest to develop and implement a clear, directed and strategic gender program to enhance women's participation in all aspects of the ocean economy, including industry, management and governance.

The findings and the recommendations of our study have been presented to the State Council of China via CCICED. They should be already in the hands of the panel members involved in drafting up the 14th FYP. We sincerely hope that our recommendations will be reflected in its policy statement. 

## OCEAN SOLUTIONS

# Twenty plastic-busting inventions to clean our rivers and seas

From plastic-devouring machines to watchful drones, these technologies are helping tackle plastic pollution in the ocean

Emma Bryce | May 10, 2021

There's an incomprehensible amount of plastic in the ocean – estimates put the known total at 5 trillion individual pieces, or around 150 million tonnes. An additional 8 million tonnes finds its

way into the ocean every year. That's only increased thanks to Covid-19 and the resulting surge in single-use items like masks and gloves.

Most plastic enters the ocean via rivers, which carry vast amounts of waste from inland sources. Once in

the ocean, plastic is broken down by the sun's rays and by wind and waves, eventually transforming into smaller fragments called microplastics. But the hardy nature of the material means that this process can take hundreds of years. In the meantime, plastic – both macro and micro – wreaks havoc on marine life. It brings the risk of entanglement, and starvation (as species mistake plastics for food). As it enters the food chain, it also potentially leaches toxins into animals' bodies – with as-yet largely unknown effects on these creatures, and the humans who consume them.

Around the world, inventors, scientists and entrepreneurs are trying to innovate us out of this predicament. With everything from plastic-munching machines, to watchful drones and microplastic-dissolving



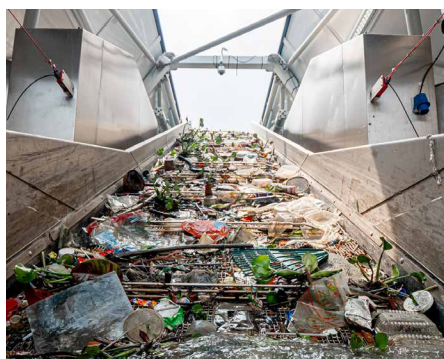


*Plastic waste collected in the Great Pacific Garbage Patch by a prototype boom (Image: The Ocean Cleanup)*

technologies, they're finding clever ways to remove plastics from the ocean – or to stop it reaching there in the first place. The majority of these inventions target pollution in rivers, down which most waste travels before reaching the seas. Some, however, venture much further out to tackle the gargantuan task of scooping plastic directly out of the open ocean.

But can technology really solve the plastics crisis? Arguably, the only real solution is to stop making so much plastic available to infiltrate the environment in the first place. That not only means reusing and recycling more, but also drastically reducing the production of single-use plastics, which are used for a day but can persist in the environment for centuries. And, ultimately, it means closing the tap on all non-essential production of this material. Combined action from governments, companies and consumers is the only way to move the dial on this ultimate goal.

Even if we do all of this, however, these changes will be gradual – taking years, if not decades, to unfold. And in the interim, tonnes of plastic will continue entering rivers and flowing into the seas. So while we figure out how to break up with plastic, the 20 inventions below can play a role in reducing its impact, and perhaps unpicking some of the damage that's already been done.



*The Interceptor barge is one innovation helping to clear rivers of plastic waste before it enters the sea (Image: The Ocean Cleanup)*



*(Video: The Ocean Cleanup)*

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



## Rehabilitating rivers

The barge-like **Interceptor** can detain thousands of tonnes of plastic before it reaches the ocean. Invented by Dutch NGO The Ocean Cleanup, the main structure is attached to a barrier stretching at an angle across a river, which directs drifting plastic into the barge. Once there, it goes along a conveyor belt and into the Interceptor's belly, where it's sorted and readied for recycling. The structure is solar-powered, and can remove 50 tonnes or more of plastic waste a day. Currently, it's being put to work in three waterways – in Malaysia, Indonesia and the Dominican Republic – but the inventors have a more ambitious goal: ultimately, they want to deploy Interceptors on the world's 1,000 most polluted rivers, where they could collectively rake up millions of tonnes of plastic before it flows into the sea.

This idea is not unlike **Mr. Trash Wheel**, a smaller-scale, plastic-gathering invention that's been in Baltimore City's harbour since 2014. The solar- and hydro-powered machine, fitted with comical googly eyes, slurps up plastic river trash that's funnelled by a containment boom towards its mouth. Since 2014, two other charismatic plastic-munching machines have been added to the Trash Wheel "family". They've collectively gathered almost 1,500

tonnes of plastic waste and debris from Baltimore's rivers.

Another invention takes a more abstract approach to the problem of plastic pollution. The Netherlands-based **Great Bubble Barrier** intercepts waste with the help of a pipe, fitted with holes, and laid across riverbeds.

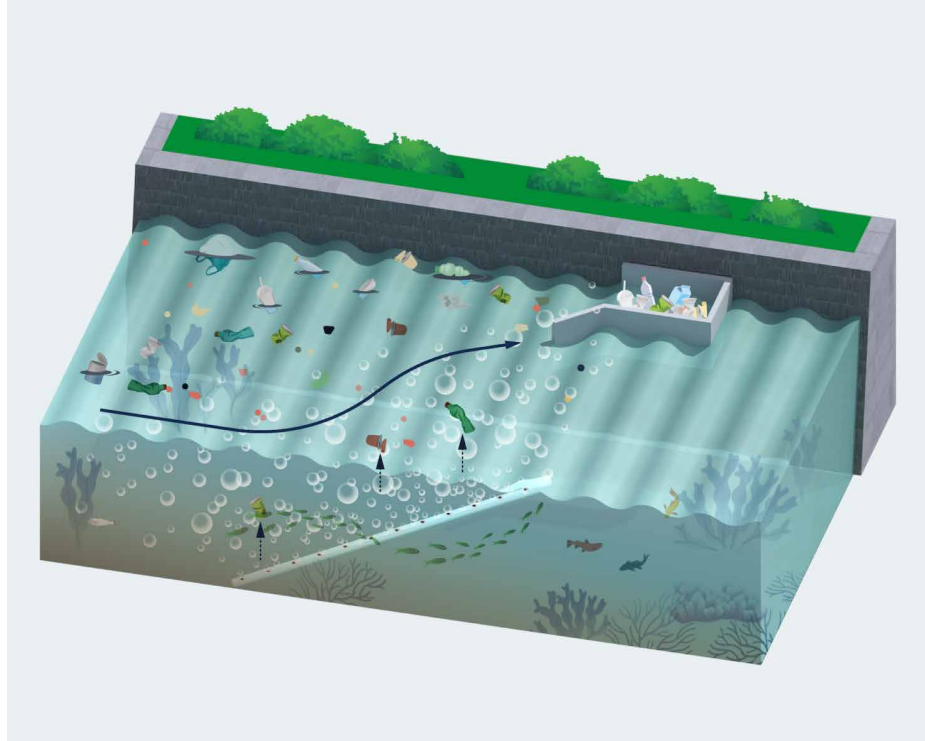
When the pipe is pumped full of air, it releases a dense stream of bubbles that, for plastic, creates an almost impassable wall across the river. Waste gets diverted towards the riverbank, where it's gathered and recycled.

In early trials in the Netherlands' River IJssel the bubble screen stopped 86% of waste. It also increased oxygen levels in rivers, supporting aquatic life. Now a permanent Bubble Barrier has been installed in one of Amsterdam's canals, where it stops plastic entering the IJssel, the North Sea and ultimately the global ocean.

Meanwhile, a company called Ichthion has developed an invention called **Azure**, designed to intercept waste in two major Ecuadorian rivers, before it is carried out on ocean currents to the famously biodiverse Galapagos Islands. This invention also uses a barrier to direct waste onto conveyor belts, which run along the riverbank, and deposit it into receptacles. But Azure's conveyor belt system is also equipped with cameras that snap images of the waste, and then use algorithms to identify the plastic by type. That will help authorities understand how best to reduce waste at source. Azure is currently at pilot scale, but once up and running, it's expected to capture 80 tonnes of waste per day.

### Surveillance schemes

Along the Jiulong River in the Chinese port city of Xiamen, researchers have installed three cameras: their job is to track the slow passage of plastic pollution as it wends its way towards the ocean. This project, run by **Xiamen University**, is using the vast repository of visual data collected by the cameras to identify patterns in the movement of waste downriver; that enables the researchers to make daily forecasts about where plastic



*The Great Bubble Barrier (Graphic: Jing Zhang / China Dialogue Ocean)*

pollution is likely to flow the next day. The information is then shared with the city, so authorities can collect it efficiently, before it reaches the sea. This predictive camera-surveillance approach is just one part of a wider plan Xiamen has in place to identify sources of waste entering rivers.

The concept of plastic surveillance is spreading to other cities, too. On the River Thames in London, the Buriganga River in Dhaka, and along stormwater channels in Hobart, **surveillance cameras** sporadically snap photographs of river waste floating by. These are part of an international project pioneered by Australia's Commonwealth Scientific and Industrial Research Organisation,

which has so far amassed over 6,000 photos from water bodies in these three cities. Using artificial intelligence, it's training computers to automatically identify plastic pollution in the photos, and to place it into one of 30 categories. That's already revealed that some of the most common forms of waste are food packaging and plastic bottles, helping cities make more informed decisions about how to tackle it at source.

In other places, drones have become a critical plastic-tracking tool. In the Philippines, a partnership between researchers from that country and the German Research Center for Artificial Intelligence has led to the lift-off of a drone fleet that's **mapping plastic**







*An image from one of the three cameras monitoring plastic pollution on the Jiulong River near Xiamen. The red areas mark floating waste identified by the computer. (Image: Zhang Caiyun)*

**pollution** in rivers flowing into the highly-polluted Manila Bay. The researchers have applied machine-learning to analyse the resulting video footage, which is combined with footage from cameras positioned on river bridges to detect waste flowing into the bay. So far, the project, which is funded by the World Bank, has pinpointed several hotspots where the majority of plastic pollution congregates before entering the bay. It's hoped that, alongside further field surveys, the drone's mapping efforts will inform government interventions to stem the waste.

Visual surveillance technologies can only detect waste on the surface of rivers, lakes and oceans – not the plastic sunk beneath – which means they're only revealing part of the picture. But they are, nevertheless, providing the best estimates we can get on the scale of the challenge. The **Ellipsis Earth** project, for one, has an ambitiously global focus: Ellipsis crowd-sources global footage produced by drones, satellites, submarines and even CCTV, and augments it with imagery from their own drones. The result is a vast visual repository that they can rake through to identify plastic waste across the planet. Their programmes can now identify plastic with 93% accuracy, and they're using their findings to create a worldwide heat map of global pollution – information they're sharing with

governments, NGOs and educational institutions to encourage action on plastic waste.

Meanwhile, the European Space Agency (ESA) is zooming out on the challenge, putting its satellites to the test. In **recent research**, they showed they were able to train satellites, using machine learning, to identify the unique optical signatures that plastic pollution creates when viewed from above. Their satellites can now do this with 86% accuracy, distinguishing plastic from other types of earthly debris. That's enabled the ESA to track plastic waste from thousands of kilometres above – generating a truly global perspective on the problem. While the technology is still in its early stages, as it's streamlined the goal is to chart a global map of plastic waste, so we can get a handle on the challenge and identify where to focus our efforts.

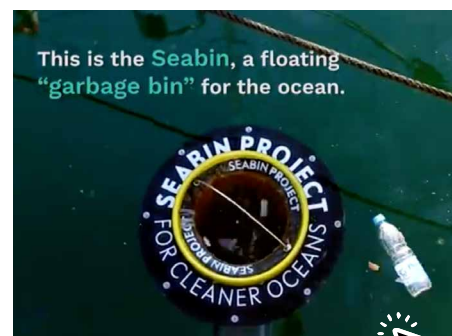
### Small solutions

Smaller clean-up efforts can also be a surprisingly big part of the solution. Take the **Seabin Project**, which began small-scale in Australia. The idea is to distribute plastic-catching “garbage bins” to harbours, marinas and ports. These bins move with the tides, filtering seawater and capturing any floating waste within. It's a simple but effective solution, which has grown and grown. So far there are over 800 Seabins in more than

50 countries. Each one can capture 1.4 tonnes of waste a year.

From the Dutch company RanMarine, there's the **WasteShark**, an autonomous water drone, about the size of a canoe, that skims the calm waters of ports, harbours and marinas and gulps up any floating trash and polluting oils in its path. The device can collect half a tonne of waste a day, which is returned to land to be repurposed. The WasteShark is also equipped to measure water quality as it putts around. Similarly, an early prototype floating robot called **FRED**, being developed by San Diego-based non-profit Clear Blue Sea, is designed to scoop up plastic waste offshore. Modelled roughly on a catamaran, it uses conveyor belts to winch waste up out of the sea, and can take in items ranging from 10 millimetres to 1 metre long.

Then there's **Hoola One**, a Canadian invention to tackle the huge problem of microplastics embedded in beach sand. This Hoover-like contraption sucks up sand, then uses a tank of water to separate floating microplastics from sinking natural material, which is returned to the beach. Meanwhile, the microplastics (the machine can capture fragments as small as 0.05 millimetres) are siphoned off and contained. So far, Hoola One has been tested on Kamilo Beach in Hawaii, one of the most polluted shores in the world. Trials showed it could clean three gallons of sand a minute, and gobble up 48 kilograms of microplastics in just a few hours.



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

## Boom it

In 2019, a 600-metre-long **crescent-shaped boom** was deployed in the Pacific Ocean to scoop up plastic from the Great Pacific Garbage Patch – the biggest of the world's five enormous waste-accumulating gyres (circulating ocean currents). Built by The Ocean Cleanup, this boom was one in a line of prototypes designed to remove some of the several million tonnes of plastic that have made their fateful path into the ocean, and which mostly circulate in those gyres. The NGO's prototypes are made up of a containment boom attached to a floating anchor, which counterbalances the boom against strong ocean currents, waves and wind. That ensures the boom is always moving slower than the surrounding sea, enabling it to capture the waste that drifts into it. With their invention, The Ocean Cleanup has essentially created an artificial "coastline" in the middle of the Pacific, against which floating plastic gathers, and is later collected by boats that service the area.

The technology has been in development since 2012, but after several technical hiccups, only in 2019 did the boom finally gather its first batch of ocean plastic. Now the team is building on that success with a new version of the boom, currently being trialled in the North Sea. They hope to scale up and ultimately distribute several of their waste-snaring booms across the ocean's five gyres. By 2040, they believe their invention could extract 90% of the ocean's plastic waste.

Using boom technology in the oceans is an ambitious undertaking, but it's already having a measurable impact in rivers around the world, where it's much easier to apply. For instance, at the mouth of Greece's Kissifos River, a containment boom called the **Tactical Recovery System Hellas (TRASH)** directs floating waste into cages waiting at the surface, capturing it just before it flows into the open ocean. The cages are mechanised and remotely operated. When they're full, they're brought to the surface to disgorge their waste onto land. As part of this European Union-funded project, the plastic is then converted into a

combustible gas used to power ships and various activities at ports.

In South Africa, an initiative called **The Litterboom Project** has deployed simple booms made of piping across 20 of the country's rivers, which are managed by teams onshore who routinely haul in the waste to sort and recycle it. So far, these Litterbooms have intercepted 120,000 kilograms of plastic on their usual path to the sea. And even very low-tech approaches are making a difference: in Guatemala, floating booms made from lines of empty plastic bottles strung across rivers – named **"biofences"** by their inventors – have successfully reduced the passage of plastic downstream by 60%.

## On the horizon

Other inventions haven't quite yet reached water, but are on their way. For instance, one team of Chinese and Australian scientists sees the potential of nanotechnology to one day vanquish microplastics in the ocean. Their invention is a **microscopic magnetic carbon coil**, the width of a human hair, that's coated in nitrogen and manganese. Combined, the three ingredients create high levels of reactive oxygen in water, which

degrades microplastics into less harmful components: a benign mix of salt compounds, carbon dioxide and water. When the scientists added these coils to water samples containing microplastic fragments, within a few hours, half of the microplastics had disappeared. Because the coils are magnetic, they could then be removed from the water, and reused in other samples. The scientists think their invention could be applied in wastewater treatment plants, where it could annihilate microplastics before they flow out into rivers and the sea.

Also targeting microplastics is a team of Swedish and Lebanese researchers developing a **nano-coating for plastic**. It is made of ingredients that react to sunlight in a way that weakens the plastic, causing it to crack and break apart. When they applied it to microplastics, the scientists discovered it reduced the volume of microplastic particles by 65% after a couple of weeks of light exposure. If these nano-coatings were combined with a dose of sunlight, or even simulated sunlight, in wastewater treatment plants, this could eradicate microplastics, whittling them down to nothing, before they reach the ocean. 🌀



*Developed by The Ocean Cleanup, this prototype boom was tested in 2019, successfully removing waste from the Great Pacific Garbage Patch (Image: The Ocean Cleanup)*





*In Antarctica, krill fishing companies are taking an active role in making their industry more sustainable (Image: Alamy)*

## OCEAN SOLUTIONS

# Will seafood corporations act as ocean stewards?

Committing to stewardship will be crucial for the ocean's future. New research has found some positive signs.

**Robert Blasiak, Nobuyuki Yagi**  
July 26, 2021

Communities and small-scale producers around the world have long achieved resilience and self-sufficiency through stewardship: knowledge and care shaped by an intimate understanding of their unique surroundings, and agency to act. *Talun-kebun* in Indonesia; *maeulsoop* in Korea; *kaitiakitanga* in New Zealand; *satoyama* in Japan – these and dozens of other examples of stewardship have emerged across generations, and continue to inspire and shape action and ethics today.

But our current era, the Anthropocene, is one of hyper-connectivity, with truly global movement of goods, knowledge and people. Even the most remote communities are rapidly

becoming linked into international supply chains and trade networks. What does stewardship mean in the context of globally active corporations? In many ways, transnational companies seem the antithesis of stewards: motivated by growth, shareholder dividends and short-term decision-making.

Yet growth often depends on frontiers and untapped resources, and some industries are already bumping up against planetary boundaries. In 2017, for instance, the FAO reported that only around 6% of fish stocks were “underfished”, while global fisheries catches have remained largely stagnant for the past 30 years.

Transnational corporations are also connected to diverse geographies, cultures and norms. In the seafood industry, shifting norms have elevated

many issues, from labour and human rights, to gender equality and animal welfare. At the World Economic Forum in 2019, Jim Leape noted: “If your seafood is caught by slaves, it doesn’t matter if it’s sustainable.”

So what is the recent history of an industry encountering biosphere limits and navigating a changing world of norms? Together with colleagues from academia, civil society and the private sector, we studied the role of stewardship in the seafood industry, publishing our findings this June in the journal *Frontiers in Marine Science*.

### From boycotts to ‘buycotts’

We found the seafood industry to be inextricably linked and shaped by interactions with NGOs, academia, policymakers and other industry actors.



*The use of traditional handlines to fish for mackerel in Cornwall helps keep stocks healthy (Image: Edward Parker / Alamy)*

High-profile NGO campaigns in the 1970s, for instance, focused on bycatch of charismatic species like dolphins in tuna fisheries, resulting in seafood boycotts and swift corporate, and eventually regulatory, responses.

### Milestones in seafood boycotts and labelling

Boycotts quickly led to “buycotts”, as focus expanded beyond stopping the consumption of certain types of seafood to encouraging the consumption of sustainably produced varieties. The primary vehicle for such efforts has been certifications and ecolabels, with the Marine Stewardship Council (MSC) and Aquaculture Stewardship Council certifications among the most prominent.

Ecolabels are not one-size-fits all.

More than 120 have been established since the 1990s, with varying levels of focus on social and environmental standards, and adapted to local or national settings. This proliferation can create confusion among consumers and retailers. It resulted in the establishment of the Global Sustainable Seafood Initiative (GSSI), which serves as a benchmark of certifications.

Marine Ecolabel Japan (MEL), for instance, was originally established in 2007 as a domestic labelling system. Traditionally a fish-consuming country with a high degree of trust and dependence on its local, small-scale fishers, Japan saw little need for an international labelling scheme. But growing market connections have caused a shift, pushing MEL to modify its standard and garner GSSI recognition in 2019.

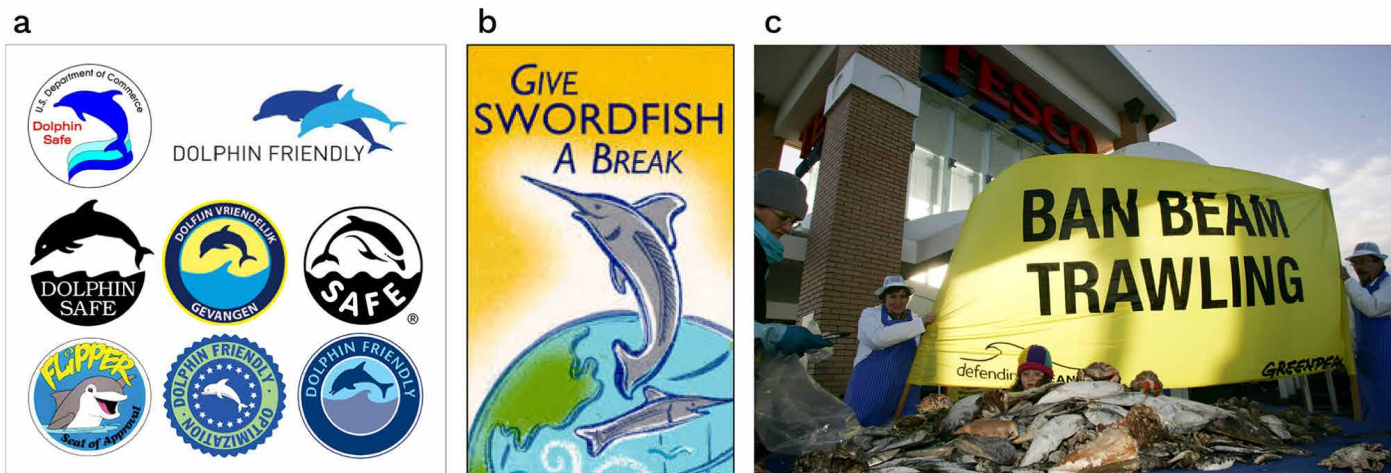
### The growing role of ‘green clubs’

More recently, green clubs – voluntary alliances of corporate actors committed to environmental or social goals that are not mandated by law – have become increasingly prominent in the seafood industry. These create a new potential for collaboration on sustainability. One such example is the Coalition of Legal Toothfish Operators (COLTO) and its forerunner ISOFISH, which brought together industry and other actors to address rampant illegality in the toothfish fishery. In 1997, around half of catch volumes were illegally caught. Transparency, cooperation and joint monitoring exercises were key to turning this around.

One factor working to the advantage of COLTO was the relatively small number of operators in the fishery. The seafood industry is highly consolidated, with the top 13 companies controlling 11–16% of global marine catch, and up to 40% of the largest and most valuable stocks. Ten of these seafood giants have formed the Seafood Business for Ocean Stewardship (SeaBOS) initiative, with a public set of shared commitments and time-bound goals for achieving transformational change in the industry to move towards ocean stewardship.

### The future of ocean stewardship

Looking closely at the past decades, some general patterns are evident.

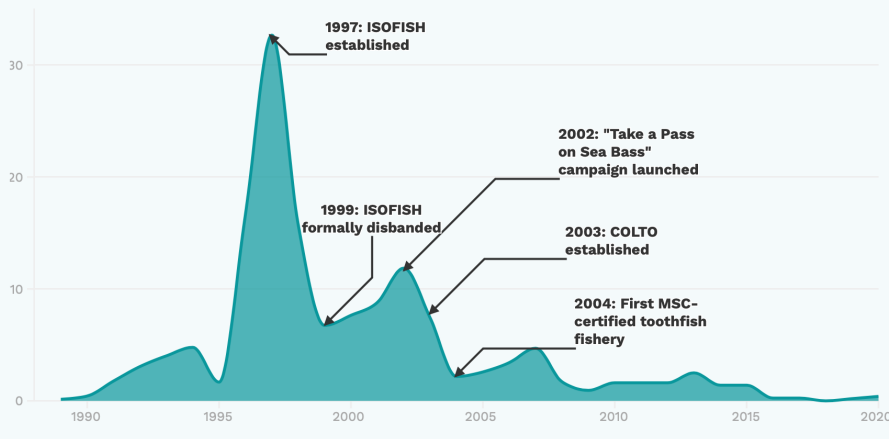


*a. Dolphin-safe tuna labels (1990 onwards) / b. Give Swordfish a Break campaign poster (1997) / c. Bycatch deposited outside a UK supermarket during Greenpeace’s “Recipe for Disaster” campaign (2005) (Images a & b: Blasiak et al. 2021, Image c © John Cobb / Greenpeace)*



## Green clubs have helped reduce the illegal catch of toothfish

Illegal catch estimates (thousand tonnes)



**Source:** Blasiak et al. 2021 • Aggregate volume of Patagonian toothfish and Antarctic toothfish. Data from CCAMLR (until 2010) and COLTO (since 2011, based on market price and surveillance data). Key stages in the elimination of illegal catches are highlighted. ISOFISH stands for International Southern Oceans Longline Fisheries Information Clearing House, and was a forerunner to COLTO (Coalition of Legal Toothfish Operators). MSC stands for Marine Stewardship Council.

Companies are beginning to move beyond simply complying with legal and regulatory policy. They are actively seeking to position themselves as leaders in a transformation towards sustainable and ethical seafood. One such example is the Association of Responsible Krill Harvesting Companies (ARK). It established a series of voluntary spatial closures (areas where no fishing is allowed) which its members have complied with since 2018. Generally speaking, voluntary measures by resource-users benefit from speedy decision-making (compared with the slow speed with which legally binding international agreements are established) and high compliance, as users have been directly involved in developing the rules.


Other industry-led efforts take a broader ecological-systems perspective. One example is steps away from turning fish fit for human consumption into aquaculture feed (given that the food-grade fish may be of nutritional value to local communities, while the aquaculture production ends up supplying high-income markets). Another is hedging against the growing risks of climate change by making fisheries resilient to unexpected shocks. This involves a focus on ecosystem-

based management and a “portfolio approach” to managing, for example, salmon stocks, which takes into account the genetic diversity of populations and sub-populations.

Some argue that stewardship is not an end goal, but rather an approach. As time passes, the list of social and ecological issues associated with


stewardship has expanded, and it is unlikely to remain static. In recent years, for instance, animal welfare has become a hot-button issue, while minimising antibiotics in aquaculture production is an area of growing attention as antimicrobial resistance increases. Yet much remains to be done – some 34% of fish stocks are being harvested at biologically unsustainable levels. In many cases, sustainable fisheries management is still a distant goal. In other cases, new technologies and approaches to transparency are redefining the boundaries of how the seafood industry can understand and lessen its footprint on marine ecosystems.

As the concept of stewardship matures within the industry, it has the potential to act as a touchpoint for a suite of other ocean-based industries.

In the context of the Anthropocene, a globally connected world, and rapid consolidation of industries, our paper concludes that the “future of the ocean and humanity’s relationship with it may rest on efforts to translate stewardship from an aspirational notion to a pillar of standard operating procedure anchored in supportive public policy”. 



*Demand from fishmeal factories along the West African coast is putting pressure on the same fish stocks local people rely on as a source of protein (Image: Mustapha Manneh / China Dialogue)*



(Image: © Christian Åslund / Greenpeace)

## OCEAN SOLUTIONS

# Can cameras replace observers on fishing vessels?

Coverage by fishing observers, always limited, has been almost non-existent during the coronavirus pandemic. Is electronic monitoring the way forward?

Shi Yi | March 18, 2021

A 360-degree camera observes the deck of a boat off New Zealand. As the fishers bring up their lines, they find they have ensnared a black petrel. The bird, with its black feathers and pale-yellow hooked beak, breeds only in New Zealand and is one of about 5,000 adults worldwide. Nobody on board noticed it diving into the water and getting trapped. The boat's main fishing line is tens of kilometres long, with

thinner subsidiary lines branching off. From these lines hang barbed hooks.

The New Zealand government and conservation bodies have been working to reduce rare bird bycatch. The fishers hurry to remove the petrel and return it to the ocean before the onboard observers see what's happened. But the camera sees and uploads all.

The authorities hope to use electronic monitoring like this to find out how many black petrels die every year after being caught in fishing gear,

and if the fishing vessels are taking measures to prevent it.

Thankfully, this was just a drill, the bird a dummy brought on board by the crew. They're working with the government, helping to train software to identify black petrel bycatch.

### The fishing industry needs remote oversight

Chris Rodley, head of SnapIt, the company developing the system, described that scene in conversation



with China Dialogue. He explained exercises like it are essential to make up for the lack of a video archive to inform the software. As things stand, the authorities need to watch hours of video manually. Machine filtering can greatly reduce the time it takes to perform the task.

Electronic monitoring could help keep tabs on catches, too. Vessel monitoring systems currently in widespread use tell regulators where a vessel is and how it is operating, but can't assess catches. Fishing logs can fill in that gap though cross-verification is hard. Actual catches can be checked against logs when the vessel arrives in port, but fish may be dumped at sea, or illegally transshipped to another vessel.

By combining location data with image recognition and other technologies, electronic monitoring would allow authorities to watch the boat as it operates and spot illegal fishing or the dumping of catch. As artificial intelligence improves so will the possibilities. Those who research fishing sustainability have high hopes.

Fishing observers act as emissaries of the authorities and can be very effective at tackling fisheries abuses. But there are only around 2,500 of them worldwide, compared to hundreds of thousands of fishing vessels. It is lonely work, sometimes involving intimidation and even death. A Taiwanese media outlet, The Reporter, found that 14 observers went missing or were harmed while working between 2010 and 2020.

Over the last year, the pandemic has forced government and fishery organisations to cut back on observation. For example, the Western and Central Pacific Fisheries Commission based in Micronesia sent observers back to their home ports for more than half of last year. An important method of keeping an eye on fishing, both in national waters and on the high seas, was lost.

Mark Zimring, large-scale fisheries director for The Nature Conservancy, said that "electronic monitoring, either used independently or as a complement



*Electronic monitoring can't be bribed, threatened, get sick, and it doesn't need to sleep. That's very, very powerful*

to observers, can't be bribed, threatened, get sick, and it doesn't need to sleep. That's very, very powerful."

### Getting ahead of the game

Electronic monitoring is not entirely new. Trials were run on sablefish and Dungeness crab vessels in Canada 30 years ago. In recent years, some Pacific Island nations have been taking the lead. In 2018, the president of Micronesia announced that by 2023 his nation would have full in-person or electronic monitoring of all tuna fishing vessels in its waters. He called

on other small island nations to do likewise, so as to make the industry more transparent. Micronesia's waters are known for their tuna stocks. Every year fishing licences are granted to about 100 vessels from around the world, but electronic monitoring is still only carried out on a few.

"The withdrawal of observers due to the pandemic highlights a need for alternative means of fishery monitoring; electronic monitoring is a suitable option in such cases," said Eugene Pangelinan, deputy director at Micronesia's National Oceanic Resource Management Authority. He told China Dialogue that political will is important if electronic monitoring is to be expanded.

But even in high-value fisheries, employing onboard observers can be prohibitively expensive. In the US, costs could reach \$700 a day for a single observer. Electronic monitoring is much cheaper.

In 2019, fishers in Maine worked with researchers to test electronic monitoring. Local scallop populations were once almost destroyed by overfishing, but the shellfish has



*There are only around 2,500 fisheries observers worldwide, compared to hundreds of thousands of fishing vessels  
(Image: © Pierre Gleizes / Greenpeace)*

returned thanks to conservation measures and warming waters. Regulators, researchers and fishers all know they need better data to manage fishing and ensure the damage does not reoccur. The fishers see supporting these trials as in their own interests. Mary Hudson, director of fisheries programs with the Maine Coast Fishermen's Association, was involved in the trial. In a podcast, she said that scallop vessels in Maine are not currently required to have observers on board, but the fishers know it will happen sooner or later. "So," she said, "they wanted to get ahead of the game, start testing out using cameras for monitoring so that when the time came, they wouldn't have to have observers on their small boats."

### The implementation challenge

The large-scale roll-out of electronic monitoring has been slow. This is concerning given the scale of the problem.

In 2018, the global recorded fishing catch reached 85 million tonnes. Much fishing activity goes on unmonitored. Research from 2016 found that as much as one-third of the global fishing catch may be unreported.

Zimring told China Dialogue that only 2,000 fishing vessels globally have the technology installed. The Nature Conservancy is working so that all large fishing vessels have it installed in the next five to ten years. There are around 100,000 such ships, some as long as 130 metres with a catch capacity of over 2,000 tonnes.

"The challenges [with expansion of electronic monitoring] are political, not technological," Zimring said. He told China Dialogue that stakeholders all have their own interests. For the boat owners, there are issues of crew privacy and information security. And in some countries, the political will is lacking.

Countless Chinese fishing vessels are at work in China and elsewhere. Official data shows the country had over 140,000 fishing vessels of all sizes as of the end of 2019, with 2,701 of these being registered for distant-



*A krill fishing vessel off the South Orkney Islands in Antarctica  
(Image © Andrew McConnell / Greenpeace)*

Official data shows  
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for distant-water fishing

water fishing. Although monitoring and transparency are on the increase, there is much room for improvement. A Chinese expert who wanted to remain anonymous, points out that the authorities are often unable to confirm that the fishing logs submitted by vessels are accurate, yet "whatever

goes in the logs ends up in the statistics."

She says for China, only a few distant-water vessels, and even fewer coastal boats, are trialling electronic monitoring. Many vessels have installed cameras of their own accord, but only for the captains and owners to use to manage the crew and ensure safety. The images are rarely saved and are not passed on to the authorities.

Another Chinese researcher, who preferred not to be named, said the AI which electronic monitoring relies on needs to be improved. For example, accuracy of analysis during different weather conditions has to get better. But he emphasised that the bigger challenge is defining each party's rights. For instance, how should disputes over information gathered by electronic monitoring be settled? "There's a long way to go yet," he said.

Despite the challenges, there are no better alternatives in sight. Zimring stressed that in the current circumstances "we're not choosing between observer and electronic monitoring. We're choosing between no monitoring and electronic monitoring." 





## OCEAN SOLUTIONS

# Designated ports could pave way for sustainable fishing in Chinese waters

By concentrating on ports, through which all domestic catch must pass, the authorities can gain the reliable data they need to set up fishing quotas

*Shenjiamen fishing port in Zhoushan, Zhejiang province (Image: Alamy)*

**Zhang Chun** | January 27, 2021

When his vessel is still far out to sea, the captain uses a mobile phone app to notify the port of his arrival. He specifies what time he'll get in, and submits catch data that the port managers will later check.

This is how it works off Taizhou, on China's eastern coast, where trials of a system designating the ports at which domestic fishing vessels can land their catches have been running since 2018. A traceability trial has also been running in parallel: each crate of fish is barcoded so it can be tracked from when it was caught

to the port and then on to market. By scanning the code with a mobile phone, anyone along the supply chain can see this information as well as where the fish were caught and by which boat.

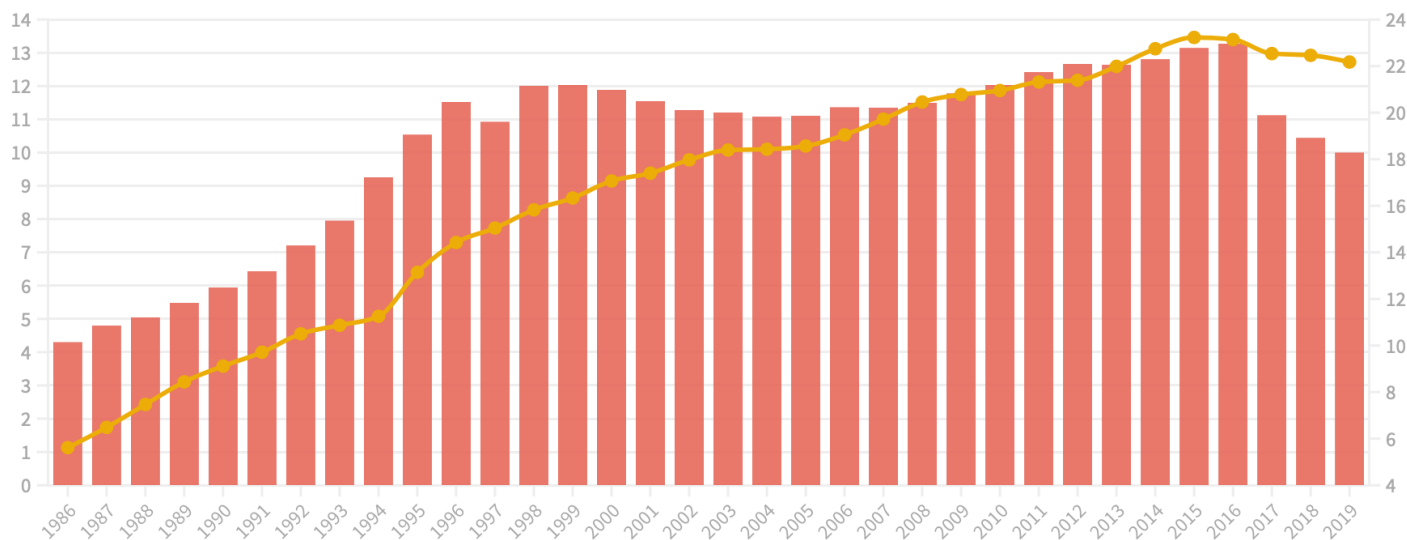
The Ministry of Agriculture (MOA) announced a first batch of 66 designated ports last year. The plan is to have enough ports approved by the end of 2021 to accommodate all fishing vessels of 12 metres or more in length. At which point, the MOA may ban the landing of catches elsewhere. Although China has more than twice as many vessels shorter than 12 metres, the longer group has almost seven times the total horsepower

and accounts for the bulk of Chinese coastal fishing capacity.

The designated port scheme is part of overall reforms to the management of ports and fishing vessels in China. While previous oversight focused on vessels at sea, the new reforms aim to allow sustainable fisheries management, with better reporting of when vessels enter and leave, and various checks, including of landed catches, catch quantity, legal compliance and vessel safety management. These will all be handled at the port, where fishing sector workers, vessels and catches come together.

## China's coastal fishing catch and capacity (1986-2019)

■ Total engine power (million horsepower) ■ Total catch (million tonnes)



Source: Compiled by Greenpeace from the China Fishing Statistics Yearbook

### Why designate ports?

“The designated ports are a very important starting point for our reforms, and will solve issues with checking data on catches landed,” Tang Yi, a professor at Shanghai Ocean University, told China Dialogue Ocean.

Currently, China's catch statistics are reported upwards through various levels of fisheries authorities, and discrepancies can be quite large. But as the ports are a bottleneck through which all fish must pass as they move from sea to table, the designation system should allow landed weight information to be reported accurately and properly checked.

This data matters for sustainable fisheries management. The fishing quota system included in the version of China's Fisheries Law that was revised in 2000 has never been implemented due to problems with data, oversight of the fish trade and technology.

Without monitoring catches on their arrival in port and transfer to market, fish are landed and sold freely. That has allowed over-fishing, reducing the effect of both controls on fishing capacity and stricter closed seasons.

Limits on vessel numbers and horsepower date back to the late 1980s and have featured in a number of China's five-year plans for economic development.

But data from 2003 to 2014 show that while vessel numbers fell, overall horsepower rose. Experts put that failure down to a lack of enforcement. There was, for example, nothing to stop a large vessel registering as a smaller one. The first closed seasons started in 1995 and they were lengthened in 2017, but while these protected fish during spawning, they did nothing to curb over-fishing at other times.

Since 1995, China's annual coastal fishing catch has always been over 10 million tonnes. In 2016, it reached 13.28 million, far above the level recommended by experts. The fish caught are becoming younger and smaller as a result of this overfishing.

It was only in 2017 that a system for comprehensively managing ocean fisheries became a major item on the Ministry of Agriculture's agenda. This meant China would start managing fishing catches, alongside existing controls on vessel numbers and total horsepower. That year, Dongying in Shandong and Taizhou in Zhejiang began the country's first trials of fishing quotas. The following year, Taizhou trialled a system that combined management of both fishing ports and fishing vessels. The designated port system, and the associated traceability scheme, are part of these ongoing reforms. In the future, ports will be more than places where

boats moor, unload and supply – they will be fishing management hubs.

### What is a designated port?

There's no official word yet on how the designated port system will actually work. But the trials in Taizhou provide a clue. First, decide on total allowable catches and allocate those quotas to fishing vessels. Then monitor catches and trading, and carry out checks at designated ports. Meanwhile, ensure traceability to monitor the total catch and prevent illegal fishing.

Certain things need to be in place to achieve all this: managers and law enforcement officials based at the port; a designated fish market for trading; appropriate facilities for unloading the fish; and electronic monitoring equipment at the harbour mouth. The real challenge is ensuring all these systems work together.

The port office at Shitang in Taizhou has a port management system that allows it to see which vessels are arriving and leaving in real time. An electronic barrier at the mouth of the harbour identifies vessels arriving that have not registered, so they can be checked. Vessels participating in the trial have satellite trackers fitted so their location can be seen at all times, in all weathers. And barcodes let the fishing boats, catch carrier vessels and buyers at port report



what they've caught or purchased directly to the management system. Getting all that up and running is expensive, and it takes some time to bed in.

The trials in Taizhou and Yantai have somebody to help with this. The “port chief” coordinates changes and keeps an eye on progress. When it becomes necessary to work across various domains – fishing authorities, planning authorities, government finance, market oversight, environmental protection, meteorology, fire-fighting – the port chief acts as the go-between and decision maker.

In April 2019, a meeting on the port and fishing vessel reforms proposed a full roll-out of the port chief system. Ports including Zhoushan in Zhejiang, Nantong in Jiangsu and Weihai in Shandong issued plans for implementation, using the port chief system as the starting point.

### When is it happening?

We aren't going to see a nationwide roll-out of designated ports right away. A full list of them is only due by the end of the year. According to one fisheries expert, there will be two new

batches announced before then, but it is unclear when the system will be fully implemented.

The ports announced so far are not evenly distributed. Shandong and Guangdong have the most, with 24 and 18, but the Liaodong peninsula and Fujian have one and three, despite having just as many ports. It seems some provinces have not yet applied, judging by 2018 data on the number of ports nationwide. Some of these may not have the necessary conditions in place. But then, according to the expert mentioned above, local governments do not need to apply for designated port status even once those conditions are in place.

China's larger ports are categorised as Central, Tier 1 or Tier 2, in descending order of size. In 2018, China published development plans for its ports up until 2025, with the aim of improving safety and management. Under those plans, the number of Central and Tier 1 ports will reach 237 by 2025, while Tier 2 ports and (the even smaller) shelter anchorages are to be upgraded and repaired. Central, Tier 1 or Tier 2 ports will be the main

sites for fish landing in the future.

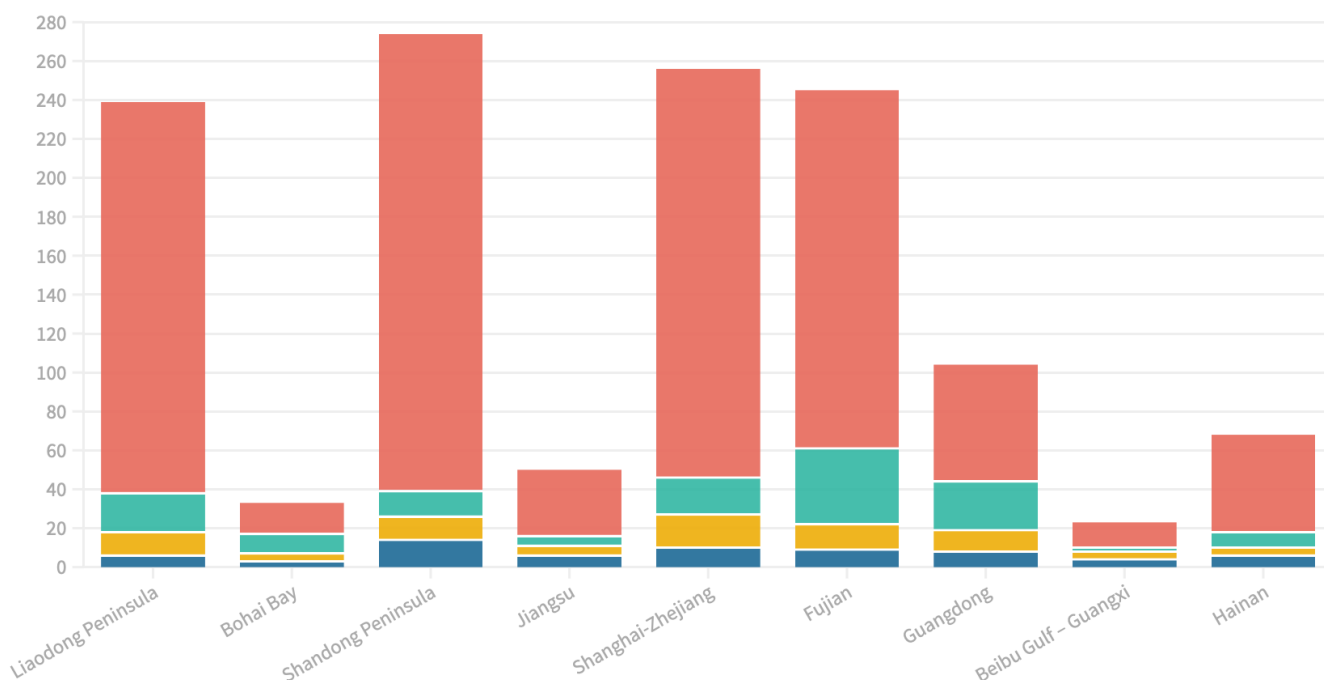
Of course, the question of the smaller fishing vessels also needs to be addressed if sustainable fishing is to be achieved in China's waters.

Small vessels currently make up half of the domestic motor-powered fishing fleet. There are 150,000 of them and in places like Shandong, Fujian, Guangdong and Hainan they account for 70% of all vessels. Most belong to subsistence fishers, but their catch cannot be overlooked. These boats can also transfer catches between the larger fishing vessels and ports.

The designated ports system for larger fishing vessels and the traceability scheme are included in a draft of a new revision to the Fisheries Law that was published in 2019. The draft also rules that designated ports and traceability for small fishing vessels will be implemented via city-level fishery authorities. That revision is not yet law, and it is not known how or when local governments would do this implementing. But if it does not happen promptly, it may undercut the effectiveness of the designated port scheme for larger vessels. 🔄

## China's fishing ports, distribution

■ Central ports ■ Tier 1 ports ■ Tier 2 ports ■ Tier 3 or smaller



Source: Compiled from the National Port Plan 2018-2025

# Electric vehicles can drive more responsible mining

Dumping nickel mine waste in the ocean is a risk to coral reefs, but the sector is under pressure to clean up

**Pius Ginting, Payal Sampat**

February 12, 2021

The ocean waters surrounding eastern Indonesia and Papua New Guinea lie within the biodiverse Coral Triangle, home to some of the world's most highly concentrated – and endangered – coral reefs. In addition to being globally significant ecological sites, the reefs supply habitat for several important commercial and subsistence fisheries central to local communities' lives.

Meanwhile, the area's nickel deposits are attracting the attention of electric vehicle manufacturers, which rely on batteries containing nickel and other minerals like lithium and cobalt. Nickel demand is expected to increase

six-fold by 2030 and Indonesia, which is already the world's largest nickel producer, is dramatically scaling up production to meet it.

But it will require an about-face on a pollution problem that has plagued the country's mining sector for years: deep sea disposal of mine waste, known as tailings. Indonesians have long opposed the practice, citing evidence that the tailings would decimate fragile reefs and strain fisheries already suffering the impacts of the coal plants used to power existing operations.

Tesla CEO Elon Musk famously promised a “giant contract” to any company able to source nickel “efficiently and in an environmentally sensitive way”. Earlier this month, Tesla

submitted an investment proposal to the Indonesian government. The next day, the country announced that new mining projects would not be permitted to dump waste into the ocean.

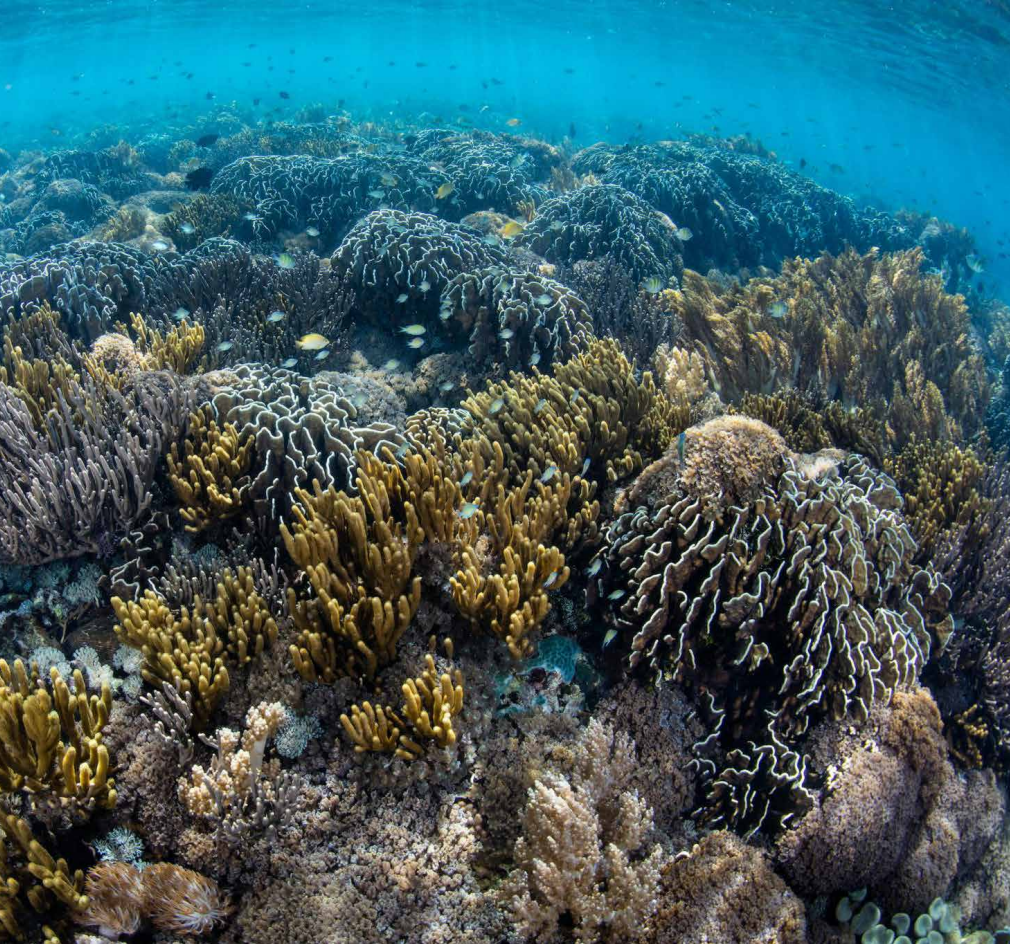
Tesla's move shows the power that companies have to demand responsibly sourced minerals in their products. They must use this power to ensure that the path to a clean energy economy isn't littered with mine waste and human rights abuses.

Each year, mining companies dump over 220 million tons of hazardous mine waste, known as tailings, directly into oceans, rivers and lakes. Tailings are the sludge that remains once the mineral is extracted from the ore. They contain processing chemicals

*Tailings being loaded into a truck at a nickel mine in South Sulawesi, Indonesia. 220 million tonnes of hazardous mine waste is dumped into oceans, rivers and lakes each year. (Image: Putu Artana / Alamy)*







*A healthy coral reef in Indonesia (Image: Alamy)*

and naturally occurring elements such as arsenic that become toxic when exposed to air or water. This dangerous cocktail smothers fragile organisms living on the seafloor. The tailings can also spread, contaminating sea life consumed by residents and destroying coral reefs and other habitats.

Ocean dumping is a cheap and convenient way to dispose of mine waste, but it has been phased out or prohibited in most parts of the world due to its environmental and health impacts. Some mining companies still want to do it, a few governments still allow it, and the world's largest banks and investment firms still profit from it.

If Indonesia follows through with its promise to move away from ocean dumping, two major projects, one an expansion of the Indonesia Morowali Industrial Park and the other a new processing facility on Obi Island, must develop safer plans to manage tens of millions of tons of waste. Chinese companies are backing both projects, which play a role at nearly every point of the nickel supply chain, from mine to factory.

While it is exciting to take Indonesia

**220**  
**million**  
**tonnes**

of hazardous mine waste is dumped into water bodies by mining companies each year



*Pressure is mounting from consumers and investors to ensure that mineral sourcing for electric vehicle batteries is as responsible as possible*

off the list of places willing to permit ocean dumping, it's important to point out that the decision only applies to new mines. The world's largest ocean-dumping mine – Newmont Mining's Batu Hijau project – is in Indonesia and there's no sign of that changing. Existing and planned mines in neighbouring Papua New Guinea have similar pollution problems.

Viable and affordable alternatives for managing tailings are proven and broadly employed across the mining industry. And by improving the efficiency with which we use and reuse existing mineral supplies, we can minimise the need for additional mining.

The financial sector is also responding. Citigroup, Standard Chartered and Credit Suisse have prohibited or severely restricted financing for ocean dumping. Leading Norwegian asset manager, Storebrand, recently divested from Metallurgical Corporation of China over unacceptable environmental damage at the Ramu nickel and cobalt mine, which dumps millions of tons of mine waste into Coral Triangle waters each year.

The climate and clean air benefits of electric vehicles should not come at the cost of marine and land biodiversity in remote areas, marginalising the lives of residents and workers. Companies looking to profit from clean technology must use their market power to ensure the mined materials used in their products are sourced responsibly, whether it's nickel from Indonesia, cobalt from the Democratic Republic of Congo, or lithium from Argentina.

Doing so will give them a marketing edge. Tesla is not the only company with customers that demand sustainable products. Pressure is mounting from consumers and investors to ensure that mineral sourcing for electric vehicle batteries and other low-carbon technologies is as responsible as possible. Failing to get ahead of this issue could damage cleantech companies' reputations – or worse, the reputation of the clean energy transition itself. And that, as the climate models indicate, would be catastrophic. 🌱



*An autonomous ocean glider collecting data at the Great Barrier Reef  
(Image: Suzanne Long / Alamy)*

## OCEAN SOLUTIONS

# The global push to share ocean data

A promising partnership between China and the EU aims to open up an ocean of information

David Adam | October 22, 2020

It's often said that we know more about deep space than the deep sea. Marine scientists are working to change that. In recent years, technologies to sense, interpret and model the ocean have become more powerful, widespread and cheaper to install and use. Smart buoys bristling with sensors bob in the water and gather data on temperature, salinity, light and noise. Sensitive listening devices towed behind ships scan surrounding waters for life. And samples from good old-fashioned buckets and bottles thrown over the side of research vessels still play an important role in examining water.

As a result of all this activity, marine scientists are swimming in data. Much of it is collected by national

oceanographic services or research groups scattered across the world. The quality of this data varies, and so do the ways it is gathered, stored, organised and formatted. All of which presents a problem. Given the ocean is a shared resource, and one that is growing in importance for a number of environmental, social and economic reasons, it would be better if all of these overlapping, conflicting and incompatible data streams could be organised – or at the very least, better coordinated and made more accessible.

### UK efforts to improve data exchange

“In the past, the gathering of marine data was quite territorial, with people collecting data within different sectors and sometimes being quite possessive,” says Clare Postlethwaite, an oceanographer

who coordinates the Marine Environmental Data and Information Network (MEDIN) in the UK. “Now there's a big push to get data into a single place for users to find.”

This concerted push is establishing open data platforms such as MEDIN that allow many different types of user – from academics to private enterprises – to share and make use of data, helping to deliver insights quickly, avoid unnecessary research effort, and improve research quality.

MEDIN, for example, brings together organisations such as marine conservation groups, renewable energy companies and government agencies. It issues guidelines and standards on how those who generate data – on everything from seabed surveys and wave height records to the status of wildlife populations – should submit them to



a series of accredited databases so they can be re-used by others. Some of these standards refer to metadata – how, where and when the information was collected, for example. Others aim to smooth the way for interested parties to access the findings. “I think that for data to be classed as available online it should be able to be retrieved after just a couple of web-clicks. Otherwise the process can get very frustrating,” Postlethwaite says.

### Progress in the EU

There are many other open data platforms, some arranged by individual scientific field (such as bathymetry, which maps the shape of the seabed) and others by geographic area.

One of the most established such regional platforms is the European Marine Observation and Data Network (EMODnet). A key plank of the EU’s Marine Knowledge 2020 strategy, it brings together some 120 organisations from across Europe and collates, organises and shares data on seven marine themes, including geology, seabed habitats and human activities. For each, the network offers an online gateway to a range of data archives managed by local, national, regional and international organisations. Through these gateways, users have free access to standardised observations, data quality indicators and processed data products, such as maps of ocean basins.

Speaking during a webinar to celebrate EMODnet’s tenth anniversary last month, Koen Verbruggen, director of Geological Survey Ireland, said: “Before EMODnet it was very much a case of separate projects, separate silos, separate standards... there were lots of projects but not a lot of joined-up thinking.”

Verbruggen and his colleagues would carry out seabed surveys and log the results in a database from which users could download geological and bathymetric data. “But probably the easiest way to get at our data was, believe it or not, through the US, through NOAA’s National Geoscience Data Centre. So it wasn’t really ideal from the European point of view.” Becoming a member of the network helped offer direction, he said. “We had to produce joined-up data.” For smaller



*A member of China's 36th expedition to Antarctica (Image: Liu Shipping / Alamy)*

organisations, he added that the network offered the first chance to publish their data online in a shareable format.

One of the project’s goals is to tap these various data sources to produce useful products that marine companies and others can use in their work. By reducing costs and promoting the development of industries such as aquaculture, renewable energy and marine tourism, officials say the project will help to underpin Europe’s sustainable use of ocean resources – the so-called Blue Economy.

For example, the project produces monthly “vessel density” maps of European maritime activity, which show the most heavily used routes. According to project organisers, these maps will help scientists who want to monitor shipping emissions, engineers identifying the best routes to lay pipelines and cables, conservationists assessing the impact of fishing on the seafloor and companies planning offshore wind farms.

“With increasing economic activities at sea, not least the large expansion of offshore wind energy, marine space is not only at a premium, but also under growing pressure,” says Felix Leinemann, head of the European Commission’s unit in charge of maritime spatial planning. “When making maritime spatial plans to manage these new activities, planners need to know where and when other activity takes place. The availability and interoperability of these new [vessel density] maps can be an important contribution towards developing these plans.”


### Collaborating with China

The project reaches beyond Europe, too. Earlier this year, EMODnet started a collaboration with China’s National Marine Data and Information Service (NMDIS) that aims to develop the use of standards and improve global access to China’s marine data.

Among its scientific goals are plans to look at – and to try to improve – the contrasting results of European and Chinese numerical models of ocean currents and coastal vulnerability. There is also a positive political angle to the partnership, with the EU announcing it would “enhance cooperation in key areas of ocean governance” and “facilitate political convergence towards a collective approach to tackling global ocean challenges”.

Europe hopes the data collaboration project will build trust and establish strong working relationships as part of the EU-China Ocean Partnership signed in 2018. Among its goals are greater transparency on fisheries data.

The project has been delayed by the Covid-19 pandemic, but at a meeting in September last year Karmenu Vella, EU Commissioner for Environment, Maritime Affairs and Fisheries said:

“We should use our joint influence to take the lead globally and ensure the conservation and sustainable use of the oceans. We want our partnership with China to go beyond words and deliver tangible results.” 



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