

Press release

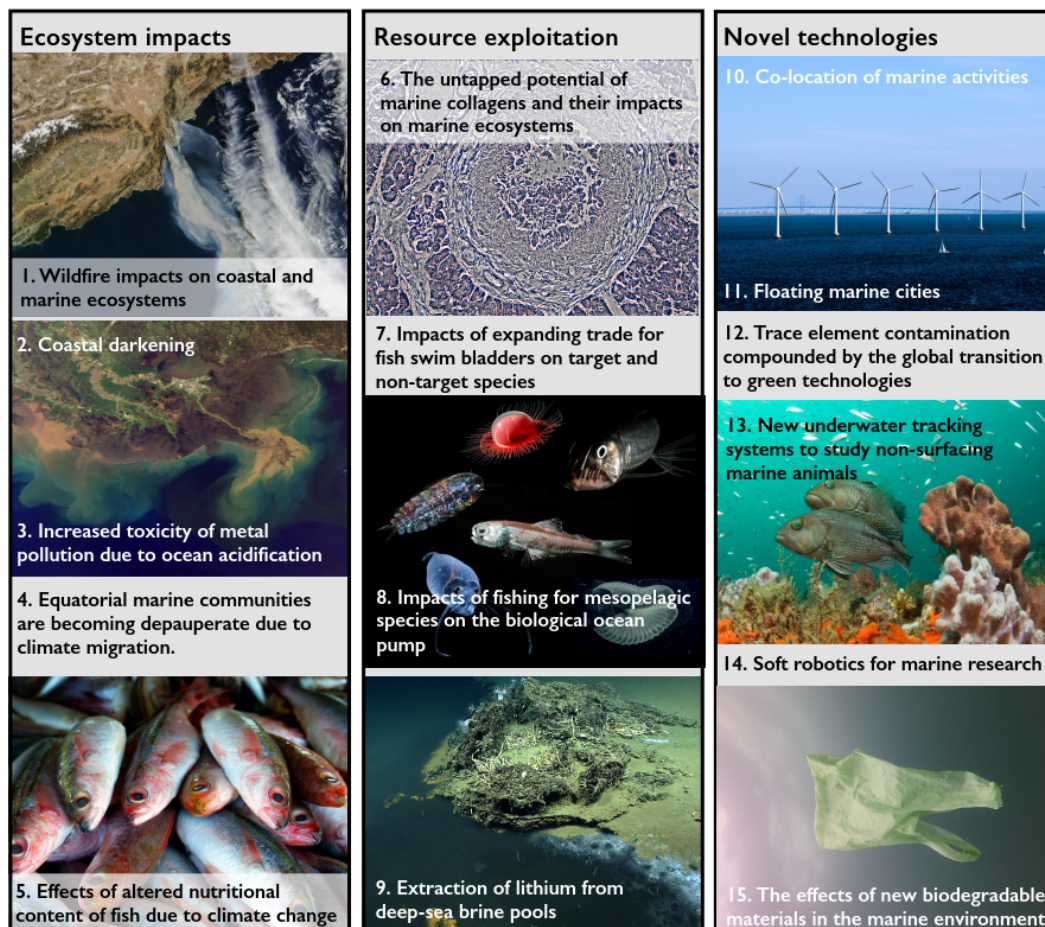
For immediate release

## Experts Predict Top Impacts on Ocean Biodiversity Over Next Decade: Lithium Extraction from the Deep Sea, Overfishing of Deeper-Water Species, and the Unexpected Ocean Impacts of Wildfires on Land are Among Fifteen Issues Experts Warn We Ought to be Addressing Now

7 July, 2022

An international team of experts including Dr Moriaki YASUHARA from the School of Biological Sciences, The Swire Institute of Marine Science, and Institute for Climate and Carbon Neutrality of The University of Hong Kong (HKU), has produced a list of 15 issues they believe are likely to have a significant impact on marine and coastal biodiversity over the next five to ten years.

Their ‘horizon scanning’ technique focuses on identifying issues that are not currently receiving widespread attention, but are likely to become important over the next decade. The aim is to raise awareness and encourage investment into full assessment of these issues now, and potentially drive policy change, before the issues have a major impact on biodiversity.



**Figure 1.** The final 15 issues identified by the team of experts. Image of brine pool courtesy of the NOAA Office of Ocean Exploration and Research, Gulf of Mexico 2014.

The issues include the impacts of wildfires on coastal ecosystems, the effects of new biodegradable materials on the marine environment, and an ‘empty’ zone at the equator as species move away from this warming region of the ocean.

“Marine and coastal ecosystems face a wide range of emerging issues that are poorly recognised or understood, each having the potential to impact biodiversity,” said Dr James HERBERT-READ in the University of Cambridge’s Department of Zoology, joint first author of the paper. He added, “By highlighting future issues, we’re pointing to where changes must be made today – both in monitoring and policy – to protect our marine and coastal environments.”

The horizon scan involved 30 experts in marine and coastal systems from 11 countries in the global north and south, from a variety of backgrounds including scientists and policy-makers. The results are published today in the journal *Nature Ecology and Evolution*.

Dr Moriaki Yasuhara of HKU School of Biological Sciences said, some of these issues are critically relevant to Hong Kong or Southeast Asia broadly, “For example, the decline of tropical biodiversity due to global warming and resulting in the moving away of tropical species to a higher latitude, may substantially erode the biodiversity of the Coral Triangle, Southeast Asian region of Philippines, Hong Kong to the North, Indonesia to the west, and Papua New Guinea to the east, where are known as the places of highest marine biodiversity in the world. Fancy seafood trades such as fish maw are a serious conservation issue, especially in Hong Kong as the global hub of such trades and Mainland China as the main consumer. So, this marine horizon scan clearly highlighted the importance of conducting more research in Southeast and East Asia, where tend to be understudied.”

Several of the issues identified are linked to exploitation of ocean resources. For example, deep sea ‘brine pools’ are unique marine environments home to a diversity of life and have high concentrations of salts containing lithium. The authors warn that rising demand for lithium for electric vehicle batteries may put these environments at risk. They call for rules to ensure biodiversity is assessed before deep-sea brine pools are exploited.

While overfishing is an immediate problem, the horizon scan looked beyond this to what might happen next. The authors think there may soon be a move to fishing in the deeper waters of the mesopelagic zone (a depth of 200m – 1000m), where fish are not fit for human consumption but can be sold as food to fish farms.

“There are areas where we believe immediate changes could prevent huge problems arising over the next decade, such as overfishing in the ocean’s mesopelagic zone,” said Dr Ann THORNTON in the University of Cambridge’s Department of Zoology, joint first author on the paper. She added, “Curbing this would not only stop overexploitation of these fish stocks, but reduce the disruption of carbon cycling in the ocean, because these species are an ocean pump that removes carbon from our atmosphere.”

The report also highlights the potential impact of new biodegradable materials on the ocean. Some of these materials are more toxic to marine species than traditional plastics.

Herbert-Read said, “Governments are making a push for the use of biodegradable materials – but we don’t know what impacts these materials may have on ocean life.”

The authors also warn that the nutritional content of fish is declining as a consequence of climate change. Essential fatty acids tend to be produced by cold-water fish species, so as climate change raises ocean temperatures, the production of these nutritious molecules is reduced. Such changes may have impacts on both marine life and human health.

Not all of the predicted impacts are negative. The authors think the development of new technologies, such as soft robotics and better underwater tracking systems, will enable scientists to learn more about marine species and their distribution. This, in turn, will guide the development of more effective marine protected areas. But they also warn that the impacts of these technologies on biodiversity must be assessed before they are deployed at scale. Early identification of these issues, and their potential impacts on marine and coastal biodiversity, will support scientists, conservationists, resource managers, policy-makers and the wider community in addressing the challenges facing marine ecosystems.

While there are many well-known issues facing ocean biodiversity, including climate change, ocean acidification and pollution, this study focused on lesser-known emerging issues that could soon have significant impacts on marine and coastal ecosystems.

This horizon scanning process has previously been used by researchers from the Department of Zoology at Cambridge University to identify issues that have later come to prominence, for example, a scan in 2009 gave an early warning that microplastics could become a major problem in marine environments.

The United Nations has designated 2021-2030 as the ‘UN Decade of Ocean Science for Sustainable Development.’ In addition, the fifteenth Conference of the Parties (COP) to the United Nations Convention on Biological Diversity will conclude negotiations on a global biodiversity framework in late 2022. The aim is to slow and reverse the loss of biodiversity, and establish goals for positive outcomes by 2050.

This research was funded by Oceankind.

This press release was adapted from the original version drafted by the University of Cambridge.

**Reference:** Herbert-Read, J.E. *et al.* A global horizon scan of issues impacting marine and coastal biodiversity conservation. *Nature Ecology and Evolution*, July 2022.

The journal paper can be accessed here:

<https://www.nature.com/articles/s41559-022-01812-0>

For more information about Dr Moriaki Yasuhara’s research, please visit: <https://moriakiyasuhara.com>

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**Images download and captions:** <https://www.scifac.hku.hk/press>



**Image 2:** There are increasing threats and impacts faced by the marine ecosystem. Credit: Emma Johnston.

### **Supplementary information**

The full list of issues identified by the report includes:

#### **Ecosystem impacts**

1. Wildfire impacts on coastal and marine ecosystems
2. Coastal darkening
3. Increased toxicity of metal pollution due to ocean acidification
4. Equatorial marine communities becoming depauperate (lacking variety) due to climate migration
5. Altered nutritional content of fish due to climate change

#### **Resource exploitation**

6. Untapped potential of marine collagens and their impacts on marine ecosystems
7. Impacts of expanding trade for fish swim bladders on target and non-target species
8. Impacts of fishing for mesopelagic (middle-depth) species on the biological ocean pump
9. Extraction of lithium from deep-sea brine pools

#### **Novel technologies**

10. Co-location of marine activities
11. Floating marine cities
12. Trace element contamination compounded by the global transition to green technologies
13. New underwater tracking systems to study non-surfacing marine animals
14. Soft robotics for marine research
15. Effects of new biodegradable materials in the marine environment