WORKSHOP 1: DEFINING A SCIENCE-BASED AND PURPOSE-DRIVEN APPROACH TO MARINE CHEMICAL POLLUTION

—summary notes

This virtual workshop was held on June 6th 2023

ECONOMIST IMPACT

THE NIPPON FOUNDATION

Workshop 1:

Back to Blue is calling on a broad group of stakeholders to co-design a roadmap for an inclusive and collaborative global approach to ocean pollution monitoring and data governance. Please *visit our website* or *watch this short introductory video* to learn more.

This workshop, which is the first of five, sought to ask some of the big questions that will define and inform our subsequent sessions:

- Why is a co-ordinated and coherent approach to marine pollution monitoring and data governance needed?
- Which topics related to marine pollution should be prioritised?
- How should an understanding of the science behind marine pollution inform this process and roadmap?
- What are the "known unknowns" when it comes to marine pollution?

This summary report does not attempt to comprehensively represent all the views shared during the workshop; rather, it is a brief synthesis. The purpose of this report is to inform the first draft of the roadmap. We invite further comment.

Attendees:

- Yuyun Ismawati Drwiega, senior advisor and co-founder, Nexus3 Foundation
- Vicky Honda, manager, Oceans Affairs Division, The Nippon Foundation
- Kenneth Leung, professor of environmental toxicology and chemistry, and director of the State Key Laboratory of Marine Pollution, City University of Hong Kong (CityU)
- Marina Lipizer, marine scientist, National Institute of Oceanography and of Applied Geophysics (OGS)
- Dharisha Mirando, finance engagement & water risk valuation lead, China Water Risk
- Eric Okuku, principal research scientist, Kenya Marine and Fisheries Research Institute
- Rosemary Rayfus, emerita scientia professor of international law, UNSW Sydney
- Mary Ryan, vice provost for research, Imperial College London
- Soraya Silva, researcher, Center of Oceanology and Antarctic Studies, Venezuelan Institute for Scientific Research
- Zhanyun Wang, lecturer, ETH Zürich; scientist, Empa
- Amelia Wenger, CBCS senior research fellow, University of Queensland; conservation scientist, Wildlife Conservation Society (WCS)

Moderators:

- Charles Goddard, executive director, Back to Blue
- Guy Woodward, professor of ecology and deputy head of life sciences, Imperial College London

Workshop synthesis:

Discussion on PURPOSE

Back to Blue's purpose in developing a roadmap to close the marine pollution data gap is to understand and reduce the impact of pollution on ocean health and provide an evidence base to galvanise action.

- Participants broadly agreed with this purpose, which is bold and broad enough to engage many stakeholders, but "constructively ambiguous" enough to evolve as required.
- As the roadmap develops, the purpose statement may need to be defined further. For example, it may be necessary to define 'ocean health' and 'impact', consider replacing the word 'reduce' with a more ambitious term, or identify other focus areas (for example, the polluter pays principle and a greater emphasis on upstream pollution).

Discussion on SCIENCE

1. Define scope and priority: coastal areas vs open sea

- The ultimate purpose of this project must be to address pollution throughout the global ocean. However, pragmatically, there is a need to identify what is tractable and achievable in the short to medium term and what kind of research and data can yield the most gain.
- Focusing on marine pollution in coastal areas and estuaries first can help the process move faster. Jurisdiction is generally uncontested and there are relatively higher levels of data in coastal waters.
- A concurrent focus on known or suspected pollution hotspots would enable a stepped approach to understanding pollution in the open ocean. For example, the pollution associated with deep-sea mining may have a different chemical signature when in freshwater or coastal zones. Examining point source pollution events rather than a more diffused type of pollution could be one way to think about collecting data on pollution impacts in the deep sea.
- This could also help move the conversation beyond coastal and beach litter, images typically conjured up in the public imagination when talking about marine pollution.
- Nevertheless, closing the data gap beyond coastal areas and areas of known pollution is the more significant challenge and ambition. The ultimate longer-term objective should be to develop baseline data for the entire ocean.
- A focus on invisible pollution, particularly its cumulative effect and impact on biodiversity and ecosystem function, will be critical.

Recommendation 1:

A phased approach to closing the marine pollution data gap should be included, beginning in estuaries and coastal zones, moving to existing and emerging marine pollution hotspots in the open ocean, and finally encompassing the entire ocean.

2. Define scope and priority: chemicals of concern

- Little is understood about how pollutants react and change with their environment, so starting with a broad scope is a necessary step.
- The EU watchlist is a good starting point to identify pollutants of concern in the ocean, but relying solely on the list may exacerbate existing data gaps and preclude a genuinely global approach. It may also not capture chemical cocktails or pollutants specific to the ocean or not found on land or in the EU.
- Furthermore, an estimated two-thirds of chemicals currently on the global market have never been assessed by regulators, so a non-targeted approach would help assess the issue's magnitude.
- Nevertheless, investigating all 350,000 artificial chemicals and their impact is impossible. Grouping and mapping pollutants according to different typologies (such as pesticides or heavy metals, for example) or by their level of toxicity, concentration load and half-life could help prioritise them regarding their respective impact on ecosystems.
- New technologies like mass spectrometry could help overcome the challenges of wet chemistry and produce a complete chemical fingerprint of different water systems, allowing scientists to paint a big-picture overview before narrowing the focus.
- It will be critical to focus on the impact of pollution on biodiversity and human health, which are of immediate concern.
- Sampling should include both:
  - samples of water and sediment to establish concentration levels and toxicity and therefore prioritise chemicals of concern according to their typology; and
  - tissue samples of organisms across diverse food chains to better understand ecosystem impacts.

Recommendation 2.1:

Efforts to close the marine pollution data gap should be based on a comprehensive definition of pollutants, recognising that existing lists of chemicals of concern likely do not reflect the true state of marine pollution. Pollutants can be grouped by typology and prioritised by their level of toxicity and concentration.

Recommendation 2.2:

Mass spectrometry and other emerging technologies should be deployed at scale; large-scale tissue sampling of marine organisms should be deployed at scale to provide data on ecosystem impacts.

3. Standardisation of sampling

- Convincing governments and other research funders of the importance of sampling contaminants, standardisation and data sharing is a challenge. This is likely to be a bottleneck.
- A great deal of effort has gone into standardising sampling and data analysis practices in freshwater systems, but there is no standard sampling protocol in the marine environment—or none that is used widely and globally, at least. This is despite the availability of cheap passive sampling methods.
- Moving closer towards a standard sampling protocol for the ocean would be a necessary first step to closing the data gap; the transferability of standards and definitions will be critical to compare different datasets globally.
- A statistical fix could be developed to calibrate different sampling protocols and approximate a more standardised result.
- The UN Environment Programme and the Global Environment Facility have been running a global programme monitoring persistent organic pollutants for over two decades. This includes many lessons about sample standardisation and could be a good guide for developing a standard sampling protocol for ocean pollution.
- In data-poor, low-resource contexts, sampling may not always be the best use of funds. A shift towards getting information about ecosystem impacts might be a more effective way to drive and mobilise donors and governments into action.

Recommendation 3:

The development and adoption of a simple, global standard sampling protocol for marine pollution. This may include a statistical fix to approximate a standardised result from different sampling protocols.

4. Shift from one-off pollution samples to ongoing monitoring

- An extensive time series on ocean pollution is sorely needed. It is very difficult to obtain funding for this type of research.
- A specimen bank could be established to catalogue specimens in the ocean. This would shift the focus from concentrations of chemicals in the ocean towards understanding how chemicals accumulate and impact marine organisms. A specimen bank would provide time series data and be cheaper, easier to standardise and logistically simpler than widespread water monitoring.
- Regulatory solutions should be considered, too. Companies could be required to disclose more information on the volumes of chemicals produced and distribution channels, which can improve compliance with existing regulations and build a case for a 'polluter pays' principle.

Recommendation 4:

- A global, extensive time series on ocean pollution should be established. However, recognising the logistical and funding challenges, this is a long-term goal.
- A global marine specimen bank to measure the impact of pollution on marine life is also needed.

5. Gap analysis: what are the known unknowns?

- Citizen science and greater collaboration across universities and research institutes could also help expand the sampling efforts and feed into a global open-source database.
- Ultimately, a mix of approaches—from sampling and modelling to experimentation—will be needed to understand marine chemical pollution globally.

Recommendation 5:

A Global Ocean Pollution Census, conducted once a decade by universities and other research institutes, should be established to confirm a baseline measurement of ocean pollution.

Next steps:

- Please share your comments with the Back to Blue team, either in this document or by email to jessicabrown@economist.com.
- Please feel free to share this document with other colleagues who may be interested; we welcome their comments and feedback.

We will keep you updated with information about our upcoming publications, workshops and other opportunities to contribute to the roadmap's development.

Additional resources

- Please watch this ***short video*** for an overview of Back to Blue's initiative to develop a roadmap to close the marine pollution data gap and understand how this workshop fits within the process.
- ***The Invisible Wave: Getting to zero chemical pollution in the ocean***, Back to Blue (2022)
- ***The Zero-pollution ocean: A call to close the evidence gap***, Back to Blue (2023)

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