

An ocean of opportunity for data-driven climate action

Enhancing ocean observation data is essential for leveraging the oceans' potential in combating climate change. Investing in this crucial infrastructure is vital for informed decisions and effective climate action.

The escalating threat of climate change is driving the need for swift, innovative and sustainable solutions. Our oceans, vast and underutilised, are a promising resource for climate change mitigation. Harnessing the potential within is paramount when it comes to forging a resilient and sustainable future.

Revolutionary ocean-based climate solutions, from offshore wind to tidal energy and blue carbon, contain the power to reduce the emissions gap¹ by up to 21% on a 1.5°C path. This rises to an impressive 25% on a 2°C trajectory by 2050. Research by Economist Impact underscores the value of these emerging marine-based industries, projecting a potential of over US\$250bn in economic value by 2030. Work from the OECD also reveals that sectors pivotal for decarbonisation, such as offshore wind, might even outpace global economic growth.

Critical to this progress are ocean observation data (OOD). Currently, two-thirds of the marine-based climate change economy hinges on OOD. Dependence could intensify to 100% as climate change exacerbates the unpredictability of ocean condition and weather.

"Ocean observation systems deliver essential (real-time) data," says Zedenka Willis, former president of the Marine Technology Society. "[They're] crucial not only for operations but, more importantly, for assessing the impact of ocean decarbonisation efforts."

Hurdles to progress

Leveraging the power of the oceans in fighting climate change relies on advancing ocean observation systems. However, experts pinpoint challenges related to OOD as significant hurdles impeding progress towards this objective:²

- **Constrained, sporadic public funding:** public funding expands access, but ties critical data to the whims of government budgets, causing uncertainty in long-term planning. The lack of clear government budgets for ocean data hinders the ability to sustain and improve ocean observations—especially considering the public nature of essential data collection.
- **Lack of standardisation:** inefficient data collection, inconsistent methodologies and the absence of standardised global protocols result in fragmented data formats that create challenges in data discovery, accessibility and interoperability. Moreover, restrictive data-sharing policies further complicate data aggregation and standardisation efforts.

Concerning inefficient data collection methods, Adam Subhas, associate scientist at the Woods Hole Oceanographic Institution, cited an instance where a single chip crucial to one of the main sensors used in the community's globally distributed ocean observation network was discontinued by a large multinational corporation.

¹ The emissions gap is the difference between the emissions expected if current trends and policies continue and emissions consistent with limiting the global temperature increase

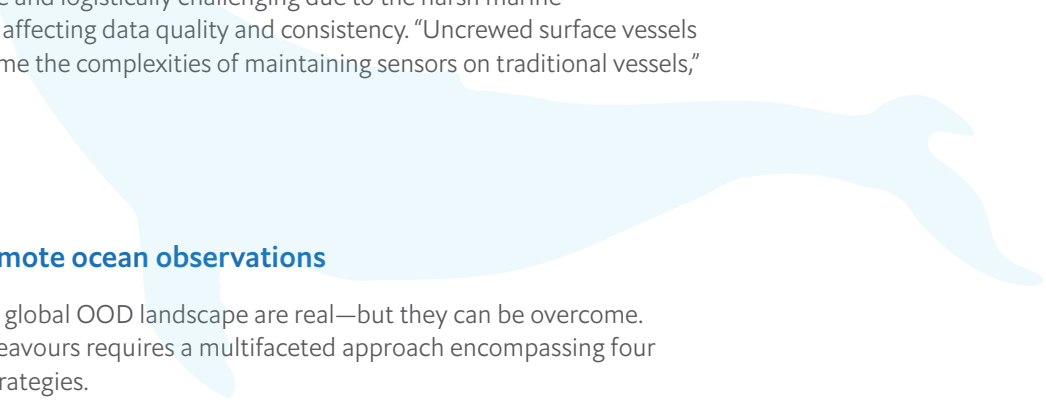
² Economist Impact interviewed 13 industry and academic experts to gather insights on the growing role of ocean observation data and its impact on the sustainable blue economy. For further details, please read the [reference note](#)

A key individual retired, leading to the shutdown of part of an international supply chain, which revealed the severe threat that lack of redundancy poses to ocean observing capability.

- **Limited expertise:** a lack of technical skills, especially in interpreting and effectively using large volumes of data, stymies marine-based mitigation efforts. Many emerging economies, including the small island nations most prone to the effects of rising sea levels, have inadequate expertise and equipment to support OOD-driven decision-making.
- **Data gaps:** vast areas of the oceans remain under-monitored or unmonitored—especially in the exclusive economic zones adjacent to the coasts of less developed countries. “There is a notable absence of sufficient data in many governments, particularly in less-industrialised and tropical countries,” says Claire Jolly, head of ocean economy and space economy at the OECD. “This hinders their ability to support oceanographic data use.”
- **Technological barriers:** deploying and maintaining advanced ocean observation technologies is expensive and logistically challenging due to the harsh marine environment, negatively affecting data quality and consistency. “Uncrewed surface vessels could potentially overcome the complexities of maintaining sensors on traditional vessels,” says Ms Willis.

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Four strategies to promote ocean observations

The weaknesses in today’s global OOD landscape are real—but they can be overcome. Elevating global OOD endeavours requires a multifaceted approach encompassing four distinct but interlocking strategies.



Improve stakeholder collaboration. Partnerships between public, private and nonprofit research organisations could leverage the strengths of each sector, combining investment, resources and expertise. Increased private investments could alleviate reliance on intermittent public funding. Creating transparent data-sharing frameworks—including open data initiatives for non-sensitive data with clearly defined terms and conditions—could broaden usage and transparency. Coastal and indigenous communities, fishermen and other local stakeholders should be involved in OOD initiatives to ensure their relevance, value and acceptance.



Establish global standards to drive cross-border co-operation. Creating standardised protocols for collecting, processing, and sharing OOD would help to ensure that all stakeholders are on the same page. Governments have a clear role to play in encouraging or mandating the standardisation of sensors, platforms and measurement methodologies to enhance data compatibility and mobility. International organisations should promote global teamwork on observation initiatives, fostering the sharing of best practices, data and tech across borders. This can help fill data gaps and build comprehensive and globally relevant datasets.



Boost funding for technology research and development initiatives and training programmes.

Seizing the oceans' full climate change mitigation potential requires upfront investments. More public and private funds need to be allocated to develop ocean observation technologies such as advanced sensors, autonomous vehicles and satellite systems. Governments and companies need to strengthen training programmes and knowledge-sharing initiatives so that more people are ready to understand and utilise OOD.



Legal and regulatory frameworks should incentivise change.

Governments have various tools at their disposal to incentivise more robust and expansive private-sector ocean data gathering and sharing. Tax breaks and grants could encourage companies to contribute more data to public databases. Streamlined permitting processes and improved regulatory certainly could encourage greater investment in data collection infrastructure.

The oceans have a massive role to play in mitigating climate change and guarding the health of our planet. By uniting in purpose and investing in innovation, we can usher in a new era where the oceans become a beacon of sustainable progress—but only if the right data are at hand to inform the right decisions.

About the research

Economist Impact's World Ocean Initiative has undertaken a unique and vital research programme to estimate the economic value of ocean observation data streams to marine-centred climate-change mitigation activities globally. It demonstrates the benefits that would accrue if public, private, academic and philanthropic initiatives could more effectively unleash the potential of ocean observation data through greater data accessibility and usability, talent development, and public-private partnerships.

By taking a first step towards improving our understanding of the economic linkages that inform and drive the blue economy, we hope to bolster the case for improved and expanded ocean observations, climate-change mitigation efforts, and research on the economic value of data for the blue economy.

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