

How ocean observations power the fight against climate change

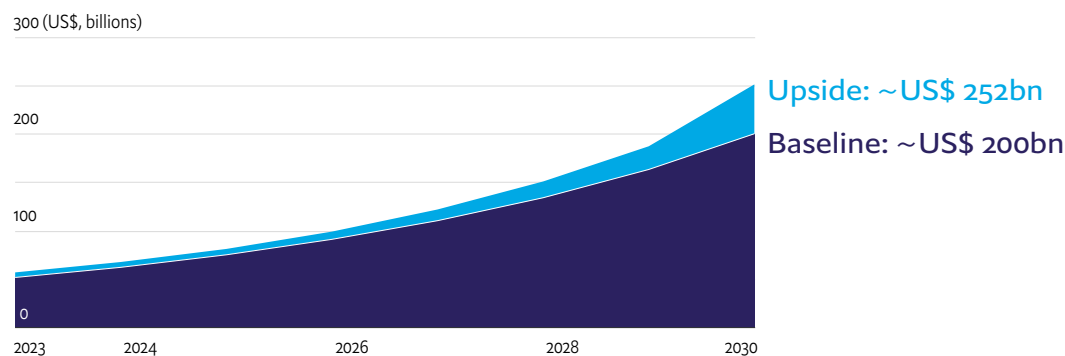
In the ongoing battle against climate change, the ocean's significance is unparalleled. As the [largest carbon sink](#) and a biodiversity powerhouse, it stands as a game-changer in our fight against the environmental crisis.

Emerging ocean-based solutions, including offshore wind, wave and tidal energy, and marine carbon dioxide removal (mCDR), have the potential to contribute a substantial [21%](#) to the emissions reductions required by 2050 if global warming is to be limited to 1.5°C. Experts suggest this estimate may prove to be conservative, especially if we are successful in unlocking the full potential of carbon capture and storage technologies in the near future.¹

The economic impact of ocean-based climate solutions is equally noteworthy. Economist Impact estimates the value of the marine-centred climate change economy at US\$52bn in gross value-added as of 2023. In an optimistic scenario, where governments and the private sector meet their 1.5°C emission targets, this figure could surge to an impressive US\$252bn by 2030—a striking fivefold increase. Yet, such rapid growth hinges on access to crucial ocean observation data (OOD).

The global marine-centred climate change mitigation sector promises sizable economic gains

Figure 1: Marine-centred climate change mitigation sector, gross value-added, 2023-2030



Source: Economist Impact estimates

Without the systematic collection of data detailing the ocean's present state and potential to generate energy, the fight against climate change could look very different.

Successfully designed and implemented ocean-based climate solutions are built on a bedrock of continuous, up-to-date data, says Zdenka Willis, former president of the Marine Technology Society. "I don't think you can have ocean-based climate mitigation without ocean observations," she says, noting that real-time data establish a baseline for projects, support monitoring of systems to prevent their degradation, and help assess the efficacy of climate practices.

¹ 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](#).

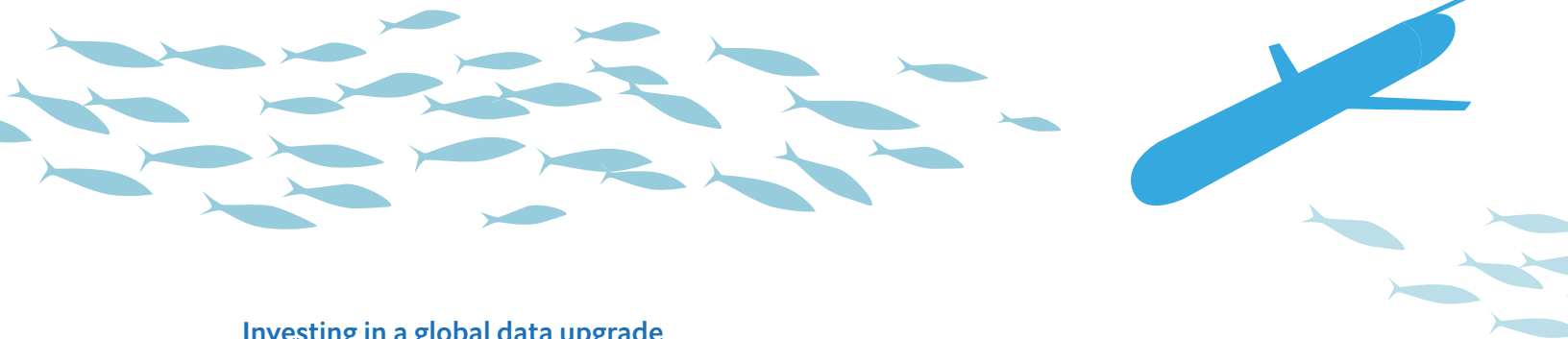
The growing role of ocean observation data

Exactly how OOD helps advance climate solutions varies by industry. For example, shipping companies monitor sea temperatures to chart fuel-efficient routes that reduce carbon emissions. Wave height data support decisions about wave energy site selection and maintenance strategies. Wind strength and pattern data inform wind farm siting choices, helping to maximise energy productivity. Some mCDR efforts rely on temperature data to identify optimal locations for seaweed farms, while other blue carbon efforts look to salinity and water quality data streams to track and preserve valuable coastal ecosystems such as mangroves.

Today, about two-thirds of the marine-centred climate change economy (US\$34bn of US\$52bn) depends on OOD. As industries scale to help meet urgent climate change mitigation goals and monitor the security, viability and effectiveness of their operations—which is especially important due to climate change-induced shifts in the ocean—their reliance on OOD will likely grow to 100%, experts say. Economist Impact projects that this will occur for all but shipping and mCDR by 2030. Even in a more conservative scenario, 90% of the marine climate change economy will rely on OOD. (Detailed estimates and projections by industry type are offered in the infographic [here](#).)

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Investing in a global data upgrade

While the present and future value of OOD is clear, so are the obstacles to realising its potential. Significant hurdles include geographically limited observation infrastructure due to the ocean’s vastness and equipment maintenance challenges; this stymies the creation of truly global data sets. A lack of universal data formats also hinders integration and prevents comprehensive insights.

What is needed, as suggested by Ms Willis and other experts, is increased investment in ocean observations, new funding models and improved data governance, among other measures. Better data not only facilitate increased economic activity worth billions of US dollars, but, more broadly, it also serves to demonstrate the unrealised value of marine-based climate change mitigation solutions to both public and private investors—thus accelerating the fight against climate change.

Consider the blue carbon industry, for example. “The industry has significant potential, but due in part to limited ocean data, among other challenges, it currently accounts for less than 1% of its carbon sequestration potential,” says John Virdin, director of the ocean policy program at Duke University’s Nicholas Institute for Environmental Policy Solutions.

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Right now, blue investments lag green investments significantly.² For the former to reach its full potential, OOD funding needs to move beyond its current overreliance on public funds, experts highlight. If private industry and investors step up to build out OOD infrastructure, helping to power growth, the return on investment will be sizable, creating a transformative impact on the marine environment and bolstering the global fight against climate change.

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.

Please note that this research was independently conducted by Economist Impact and supported by:

- Fisheries and Oceans Canada / Pêches et océans Canada
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² Green investments focus on environmentally friendly practices like renewable energy. Blue investments centre on marine conservation and sustainable ocean use. Both contribute to a more sustainable future.