



Benefits of investment in ocean science: Developing an evidence base to guide decision making

The United Nations
Decade of Ocean Science
For Sustainable Development
2021-2030



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of Ocean Science
for Sustainable Development

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1 Introduction

Sustainable Development Goal (SDG) 14, Life Below Water, is the least-funded of all SDGs.¹ Of the official development assistance spent on all SDGs through 2019, just 0.01% went to SDG 14. And of the funding estimated to be needed to achieve SDG 14, just 15% was secured by 2020.

That funding shortage is critical. SDG 14 is interconnected with multiple other goals, especially those for climate action and food security. So when ocean sustainability is underfunded, it weakens the entire 2030 Agenda for Sustainable Development.

Ocean science is a cornerstone for achieving SDG 14. It helps us understand what is happening below the waves, measure changes in ocean health, and find solutions to ocean problems. It is involved in the greening of shipping fuels, siting of offshore wind turbines, and planning of marine protected areas. It is the robust assortment of technologies and instruments that gather, store, transfer, and process ocean observation data. Nearly all aspects of the blue economy – which is estimated to reach US\$3 trillion in value by 2030² – depend in some way on science, research, and technology.

Science is the foundation of the blue economy. It is in everything. Yet according to data in the Global Ocean Science Report 2020, ocean science suffers from the same lack of funding as SDG 14 overall.³ While national governments remain the primary source of funding for ocean science, countries spend only 1.7% of their research and development money on it. This belies not just the importance of ocean science, but also the many cases of direct social and economic benefits that have accrued from investments in it.

Unlocking more investment in ocean science

The UN Decade of Ocean Science for Sustainable Development (2021-2030), under the coordination of UNESCO's Intergovernmental Oceanographic Commission (IOC), seeks to raise awareness of the need for more ocean science investment. Central to this is building evidence that such investment creates real benefits for society, including helping to achieve the 2030 Agenda.

While claims of such benefits are common, the numbers to support them are mostly based on scattered examples rather than comprehensive data. Current analyses usually focus on specific parts of ocean science (like observation systems), concentrate on investments in wealthy nations, and don't address the full scope of ocean science and its infrastructure. Because of these limitations, current arguments for increased investment don't show the full value of ocean science.

The lack of standard, repeatable methods for calculating the benefits of ocean science investment hurts credibility and transparency. This problem also wastes resources, as new methods must be created for different situations.

A new initiative led by UNESCO-IOC with the International Hydrographic Organization (IHO) posits the need for a common framework for measuring returns on ocean science investments. This framework would help track investment progress over time and identify critical gaps in priority regions like Small Island Developing States (SIDS) and Least Developed Countries (LDCs).

¹ World Economic Forum. 2022. SDG14 Financing Landscape Scan: Tracking Funds to Realize Sustainable Outcomes for the Ocean. https://www3.weforum.org/docs/WEF_Tracking_Investment_in_and_Progress_Toward_SDG14.pdf

² OECD. 2016. The Ocean Economy in 2030. https://www.oecd.org/en/publications/2016/04/the-ocean-economy-in-2030_g1g6439e.html

³ IOC/UNESCO. 2020. Global Ocean Science Report. <https://gosr.ioc-unesco.org/home>

UNESCO-IOC and IHO will launch the first phase of this initiative at the World Ocean Summit in Tokyo, Japan, in March 2025, with later phases to be introduced at the 2025 United Nations Ocean Conference in June.

This position paper

In service to the initiative, this position paper provides a concise description of the global landscape for ocean science investment, including by governments, the private financial sector, and philanthropies. It illustrates the benefits that can accrue from investing in ocean science, and examines how the needs of various investment sectors could be met more effectively. It also offers

the voices of several leaders in the blue economy and ocean science, providing their insights on how more finance for ocean science could be unlocked.

The paper is intended to trigger discussion and dialogue. It aims to strengthen the argument for increased investment, and to start examining what a standardised framework to support such investment could or should comprise. The five brief cases herein – describing a diverse selection of ocean science investments – represent just a small subset of successful projects. But they exemplify the valuable work and outcomes arising from ocean science, with a particular focus on projects in SIDS and LDCs.

2 Current landscape for financing and investment in ocean science

Describing the landscape of global investment in ocean science is not a simple endeavour. Just identifying when science has been funded can be a challenge.

Figure 1, for example, illustrates the flow of finance in the blue economy. If you had to identify how much of this flow involved science, you might see “Research/Education” in the right-most (Sector) column and pick that as the answer. Yet science of one sort or another was almost surely part of every sector in the figure: renewable energy, ports/shipping, conservation, even tourism.

As encountered by UNESCO-IOC with its aforementioned Global Ocean Science Report 2020, breaking out science from blue investment figures can be a somewhat inexact science in itself.

Most countries do not break out their ocean science investments as a budget line. So tracking down that figure requires a questionnaire as the GOSR2020 report used.

Countries answered which departments were spending public money on ocean science, who the beneficiaries were, and what types of activities were funded. The task was made even harder by low response rates to the questionnaire, and bias in those who did reply (mostly developed countries).

The GOSR2020 report remains the most authoritative assessment of global investment in ocean science to date. Still, it focuses on just one side of the coin – i.e. levels of investment – and does not look at benefits or returns on investment.

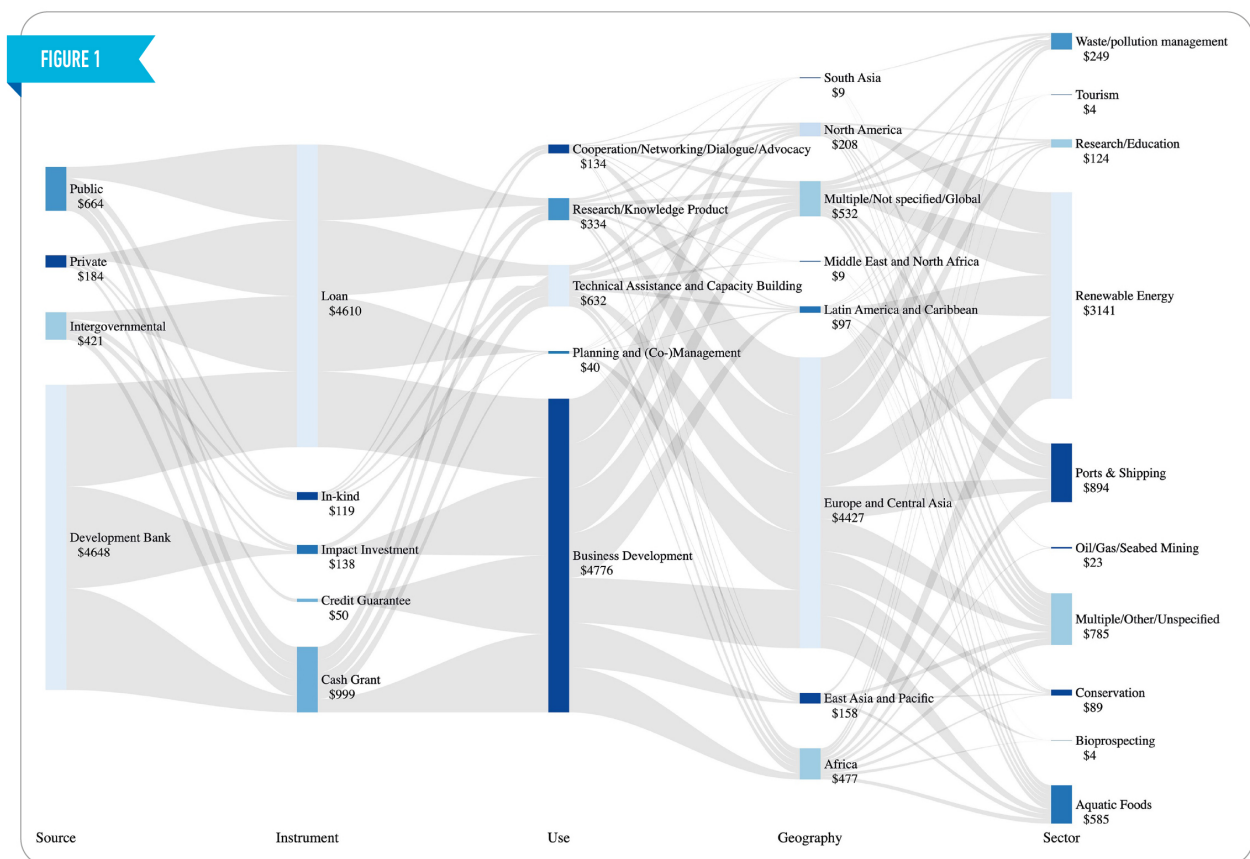


Figure 1. Blue-economy-labelled money flows (2017-2021) in millions of US\$.⁴ Graphs like this may differ markedly based on how a research team chooses to break out science.

⁴ Schutter et al. 2024. “Mapping flows of blue economy finance: Ambitious narratives, opaque actions, and social equity risks.” One Earth 7:638-649.

The next GOSR report, updating the data and building a time series, is in development now, and the standardised framework that this UNESCO-IOC initiative is proposing will be integrated with it, thus complementing information on target SDG 14.a. Better data like these will continue to be needed to see the state of ocean science investment more clearly, and to help governments and others understand not only their current funding levels of ocean science but how those investments are benefiting them.

A. Government and multilateral investment in ocean science

The policy environment for ocean science investment by governments varies widely among countries and regions, with significantly lower budgets in developing nations.

Advanced economies like the USA, China, Japan, and several European nations have established dedicated ocean research budgets, typically allocating 1-2% of their total research and development spending to ocean science.⁵

The USA is the largest single public investor in ocean science, reporting more than US\$12 billion in 2017, as documented in the GOSR2020. It was followed that year by Japan (US\$600 million) and Australia (US\$511 million). An additional six countries allocated budgets over US\$200 million:

Norway, France, Germany, the UK, the Republic of Korea, and Canada.

For financing of large research projects – on the scale of tens of millions of dollars, such as to build basic research infrastructure and monitoring systems – national governments are the main option,⁶ at least in advanced economies. Public sector funding also tends to focus on climate change impacts on ocean systems, fisheries management, marine spatial planning, and marine biodiversity conservation, among other topics.

Development banks, particularly multilateral development banks (MDBs), account for a majority of blue economy funding⁷ – roughly two-thirds of MDB funding was by the European Investment Bank alone. But MDBs are still generally new to ocean science: most of their investments focus on poverty alleviation, so any related science tends to address that. However, two cases in this paper show how successful deals have been structured with MDBs for ocean science: one involving seabed mapping in Kiribati (page 6) and the other featuring debt conversions to support marine conservation (page 15).

In addition, various intergovernmental funding sources support ocean science and blue economy development, including the Global Environment Facility and the Green Climate Fund. These international sources typically prioritise building capacity in developing nations and focus on projects with clear sustainable development outcomes.

⁵ IOC/UNESCO. 2020. Global Ocean Science Report. <https://gosr.ioc-unesco.org/home>

⁶ Personal communication with Hilairy Hartnett, director, University of Washington School of Oceanography. The school's annual research budget of roughly US\$50 million comes primarily from US federal government sources. 18 February 2025.

⁷ Schutter et al. 2024. "Mapping flows of blue economy finance: Ambitious narratives, opaque actions, and social equity risks." *One Earth* 7:638-649.

Case 1: Seabed mapping as a catalyst for sustainable development

Location: Kiribati

Partners: Government of Kiribati; International Hydrographic Organization; UK Hydrographic Office; UK Commonwealth Marine Economies Programme; World Bank; Asian Development Bank

Finance mechanisms: Grants; multilateral finance

Science involved: Seabed mapping

Background: Kiribati is the archetype of a large ocean state, with one of the largest Exclusive Economic Zones (EEZs) in the world and one of the smallest land masses. Its waters are rich in assets, both living (fish stocks) and non-living (seabed minerals). But the waters pose a threat as well: most of Kiribati's population is in the capital of Tarawa, an atoll susceptible to sea level rise. To address this, the country has sought a solution – decentralising its population to the country's outer islands, including in case of emergency.

The process started with mapping of Kiribati's waters and seabed. Entering this century, navigational charts for Kiribati were significantly out of date, making navigation unsafe. So in 2011 and 2015, the International Hydrographic Organization conducted visits to meet with local stakeholders and consider plans for mapping. After that, financing from the UK's Commonwealth Marine Economies Programme funded a scoping study to identify priority areas, conduct initial remote sensing, and develop a costed plan for the systematic mapping of the entirety of Kiribati's territorial waters. The resulting report was Kiribati's to own – reasoning that, should a multilateral bank come knocking on their door, Kiribati could present the seabed mapping plan for funding.

Sure enough, the World Bank (WB) and Asian Development Bank (ADB) each approached the government of Kiribati to gauge its development needs, and, as part of broader deliberations, officials presented the plan. What emerged was the Kiribati Outer Island Transport Infrastructure Investment Project, or KOITIIP, co-financed by WB and ADB for a combined US\$42 million over six years (2020-2026). KOITIIP has financed the planned hydrographic surveys, new maritime charts, and rehabilitation of access infrastructure on selected outer islands. In the end, the project will result in safer and more efficient navigation and shipping between islands – including opening up new economic opportunities for the country in the process.

Benefits:

- Sustainable maritime development
- Climate resilience for population
- Safer, more efficient shipping



Oceanographers don't have much experience in the development world, and MDBs don't have much experience with oceanographers. To arrive at something like KOITIIP, you need to develop enduring relationships with partners – the project is the fruit of more than 10 years of sustained effort by multiple actors. But theoretically there's no shortage of money available for this kind of work, and this project shows the value of seabed mapping in the context of sustainable development.

Sam Harper | International Hydrographic Organization⁸

⁸ Personal communication with Sam Harper, International Hydrographic Organization. 17 February 2025.

Evidence of benefits

Examples of the array of potential benefits flowing from government- or MDB-funded ocean science are wide-ranging:

- The Kiribati seabed mapping case shows how hydrographic surveys have laid the groundwork not only for climate resilience for the country's population but also for safer and more efficient shipping.
- A case from Victoria, Australia, shows how shifting the way that projected sea level rise was studied also changed the state's budgetary and planning discussions (page 9).
- Ocean observing systems – including fixed platforms, autonomous and drifting systems, submersible platforms, ships, and remote observing systems such as satellites – are using increasingly efficient technologies to collect, store, send, and process large amounts of ocean data. Ocean observations are becoming more important, expanding beyond their traditional basic science role to help monitor ocean economic activities and improve management strategies. The general public receives benefits, too: people can check water quality at beach spots, for example, or provide data through citizen science projects.
- Public funding of fisheries science and spatial planning has yielded many advances in sustainable fisheries and resource protection.

Government needs

Unlocking more investment in ocean science will require meeting the needs of decision-makers – those who choose what gets funded. In governments (depending on where the decision is made) and in MDBs, these may be individuals who are relatively unfamiliar

with ocean science or its role in the blue economy.

- Needing to see the applications and relevance: Scientists may need to make the case for ocean science – not just the value of improved knowledge in itself, but its practical applications. Although a significant portion of oceanographic research still involves basic science without direct use cases, most governments and MDBs want to see real-life benefits and impacts as a result.



In my career in science, I haven't gotten much traction with funders when I've talked only about the value of science. I've gotten traction when I talked about the application of science to something the funders cared about.

Chris Ostrander | CEO, Marine Technology Society⁹

The Victoria, Australia, case (page 9) shows how politicians disregarded sea level rise when it was expressed in centimetres. But they paid attention when it was expressed in dollars and the amount of essential infrastructure that would be affected.

- Understanding the ocean's value to the economy and society: Politics is about choices. About spending money on this project or that one; about the needs of future beneficiaries vs. current ones; about when to spend political capital or not... For ocean science investment to be unlocked, potential change makers in government need to see the value in doing it. That will require clear evidence of the benefits, and a story about why it's important. At that point, a window for political commitment may open.

⁹ Personal communication with Chris Ostrander, CEO, Marine Technology Society (MTS). 18 February 2025. MTS is a professional society that serves ocean engineers and technologists.



In general, society and government don't realise how much oceans matter to our economies and way of life. We need to do a better job of telling that story.

Anthony Boxshall | Former chair, Victorian Marine and Coastal Council¹⁰

Opportunities

The greatest opportunities for governments on ocean science investment may be in using their position to help leverage more private sector investment. Here are examples:

- De-risking: Risk is at the centre of any investment decision, and there are multiple ways that governments

can lower risk for private investors. These include by offering blended finance instruments, intermediated financing, and even skill development and advisory support for investors. The European Investment Bank, for example, has employed each of these as part of its blue economy programmes.¹¹

- Ocean data: Companies are increasingly aware of the business risks they may face from climate change and extreme weather events. Data from (traditionally) public-financed ocean observing systems is essential to interpreting those risks. There may be opportunities for governments to partner on new advanced observing systems with firms interested in applying such data for their own, or clients', purposes.

¹⁰ Personal communication with Anthony Boxshall, former chair, Victorian Marine and Coastal Council. 23 February 2025. Boxshall is also principal at *Science into Action*, a consultancy focused on translating science to decision making.

¹¹ European Investment Bank. 2024. Clean Oceans and the Blue Economy: Overview. https://www.eib.org/attachments/lucalli/20240073_clean_oceans_and_the_blue_economy_overview_2024_en.pdf

Case 2: Changing the investment conversation on sea level rise and climate risk

Location: Victoria, Australia

Partners: Victorian Marine and Coastal Council; Life Saving Victoria; Department of Energy, Environment, and Climate Action; University of Melbourne

Finance mechanisms: Project finance

Science involved: Coastal climate modelling

Background: In 2022, a University of Melbourne study¹² projected that sea level rise and storm surge would cause a cumulative economic loss to the state of Victoria of AU\$123 billion by the year 2040, and AU\$442 billion by 2100. These losses would include impacts to over 80,000 existing properties in the state, including essential infrastructure of all kinds.

The study was financed by the Victorian Marine and Coastal Council (VMaCC), Life Saving Victoria, and the state's Department of Energy, Environment, and Climate Action. Its projections of sea level rise did not differ significantly from figures that VMaCC had communicated over the prior decade. However, this study was the first to convert the prior metric – centimetres – into dollars. Suddenly, sea level rise was projected by the end of the century to have an annual cost equal to 2.7% of the state's gross product. And the cost would rise the longer mitigation measures were not taken.

In response to the report, VMaCC called for an independent taskforce to develop a comprehensive blueprint for addressing rising sea levels and storm surge impacts. Although the taskforce has not yet been formed, the report is already influencing budgeting decisions. It was a case study in the Australian Government's 2023 intergenerational report, which projected outlooks for the national economy and budgets for 40 years. And it is being used in planning by Victoria's treasury department and by Infrastructure Victoria, an independent advisory body.

Benefits:

- Improved coastal planning and management
- Greater climate resilience
- Broader awareness of climate risks



The report has given an economic lens to ministers for planning and environment. Now when they're talking about making the coast more resilient, it's not just about how to save seagrass. They're talking about measurable losses of hospitals, police stations, schools, houses, roads, and utilities. It changes investment conversations.

Anthony Boxshall | Former Chair, Victorian Marine and Coastal Council¹³

¹² Kompas et al. 2022. Economic Impacts from Sea Level Rise and Storm Surge in Victoria, Australia over the 21st Century. https://www.marineandcoastalcouncil.vic.gov.au/__data/assets/pdf_file/0030/665652/a1420184d6623d94a7f338f861_671b6c68af15d5.pdf

¹³ Personal communication with Anthony Boxshall, former chair, Victorian Marine and Coastal Council. 23 February 2025.

B. Financial sector investment in ocean science

The landscape of private investment in the blue economy is evolving fairly rapidly, with multiple “blue accelerators” emerging worldwide and venture capital investment nearly tripling in the past five years.¹⁴ However, the blue economy remains immature as an investment sector compared to others.

According to 1000 Ocean Startups – a coalition of 48 venture capital firms, accelerators, and other entities involved in sustainable blue investment – there is US\$1.5 billion in assets currently under management by its members.¹⁵ A 2025 study estimated US\$2.2 billion in venture funding has gone to “nature-positive” ocean startups since 2017,¹⁶ and a 2024 study calculated US\$138 million in impact investment from private investors was spent on blue economy projects from 2017-2021.¹⁷ These figures contrast with ocean-related industries as a whole, which represent a multi-trillion-dollar segment of the global economy. Petroleum and shipping account for a large share of that.

The early private financiers in the sustainable blue economy space have included impact investors; investment banks with dedicated blue economy divisions; corporate venture capital from established ocean industries; and insurance companies interested in coastal resilience and climate adaptation. For an example of the latter, see the case on AXA’s parametric insurance for coral reefs, insuring them against hurricane damage (page 11).

Of this private investment, much of it so far has gone to:

- Offshore renewable energy (particularly wind)
- Sustainable aquaculture and mariculture
- Port infrastructure modernisation
- Marine biotechnology
- Waste management and plastic pollution solutions
- Shipping efficiency technologies

The sector’s immaturity is evidenced by the few initial public offerings, exits, mergers, and acquisitions it has seen so far. Interviewees for this paper described private investment as waiting for a “unicorn” in the blue economy space – in other words, waiting for a privately-held blue startup to achieve US\$1 billion in value.^{18,19,20} Unicorns are considered an indicator that a sector is maturing and worthy of entry. Arguably, the first blue unicorn was Kerecis, a wound-care firm with products derived from fish skin, which sold for US\$1.3 billion in 2023.

Nonetheless, the potential for growth of private blue investment is substantial. A 2016 report by Credit Suisse estimated that investment in conservation worldwide could grow to US\$400 billion annually, through private impact investment alone.²¹ The key to unlocking that: presenting investment-ready projects that make sense to investors and provide a good return.

¹⁴ Janulis and Keller. 2025. “Unlocking Green Tech Capital for Blue Economy Ventures.” GreenMoney.

¹⁵ 1000 Ocean Startups website. <https://www.1000oceanstartups.org/home>

¹⁶ CREO. 2025. Ocean-Positive Investments Market Snapshot. https://www.dropbox.com/scl/fi/3vf0ans9ckk71u2vyc3es/2025_CREO_Ocean_Positive_Investments_Snapshot.pdf

¹⁷ Schutter et al. 2024. “Mapping flows of blue economy finance: Ambitious narratives, opaque actions, and social equity risks.” *One Earth* 7:638-649.

¹⁸ Personal communication with Claire Jolly, head, Ocean Economy & Space Economy, OECD. 26 February 2025.

¹⁹ Personal communication with Steven Fox, founding partner, Propeller VC. Propeller operates an ocean climate investment fund. 21 February 2025.

²⁰ Personal communication with Rick Wall, director of external affairs, World Ocean Council (WOC). WOC is an international business alliance for corporate ocean responsibility. Wall is also founder of the OCEANOVATION festival. 27 February 2025.

²¹ Credit Suisse. 2016. Conservation Finance from Niche to Mainstream: The Building of an Institutional Asset Class. <https://www.sprep.org/attachments/VirLib/Global/conservation-finance.pdf>

Case 3: Insuring coral reefs to enable rapid response after hurricanes

Location: Mesoamerican Reef countries (Belize, Guatemala, Honduras, Mexico)

Partners: Mesoamerican Reef Fund; KfW; Willis Towers Watson; InsuResilience Solutions Fund; Ocean Risk and Resilience Action Alliance; AXA Climate; Munich Re

Finance mechanisms: Parametric insurance

Science involved: Risk analysis and climate modelling

Background: In contrast to traditional insurance where the claims process can be lengthy and contentious, parametric insurance provides a rapid and precise response. It does this by predefining thresholds and amounts to be paid in the event of a disaster. As soon as the intensity of a climate event exceeds a certain threshold (as measured by an independent climate data provider), the pre-agreed indemnity is paid, without the need for an expert or debate over asset value.

Hurricanes can cause severe damage to coral reefs, and rapid restoration can be critical to repairing the habitats and maintaining their ecosystem services (fisheries, tourism, coastal protection). The Mesoamerican Reef Fund – a conservation trust fund for countries of the Mesoamerican Reef – worked with multiple financial partners in 2020 to offer parametric insurance to seven marine protected areas and their nearby communities. The first payout was triggered in November 2022 (US\$175,000) when Hurricane Lisa hit the reefs of Turneffe Atoll in Belize.

Parametric insurance for coral reefs has since spread elsewhere, including Hawaii, Vanuatu, Colombia, and the Wider Caribbean. In addition to accelerating payouts, this insurance opens a new field of action for insurers – allowing for coverage of previously uninsured risks and enabling insurers to help clients build robust climate resilience plans.

Benefits:

- Improved economic security
- Greater climate resilience
- New revenue stream for insurers



Emergency response groups that are trained to act immediately after a storm are critical to reef resilience outcomes. Bringing that human capacity together with financial sustainability is vital to securing reef recovery and resilience.

María José González | Executive director, Mesoamerican Reef Fund²²

²² Personal communication with María José González, executive director, Mesoamerican Reef Fund. 19 February 2025.

Evidence of benefits

The relative scarcity so far of private investment in ocean science makes an accounting of the benefits somewhat limited. Nonetheless, there are examples:

- The Nature Bonds approach pioneered by The Nature Conservancy (case on page 15) combines sovereign debt refinancing with technical assistance in science, planning, and policy to unlock funding to support large-scale conservation outcomes. The Nature Bonds Program director aims for the financial aspects of the projects to become mainstreamed enough that they are seen as low-risk, even “boring”, for investors.²³ The model for using debt conversions to support ambitious conservation and climate outcomes is now being deployed by other non-governmental organisations (NGOs), including by social sectors outside of conservation.
- Parametric insurance for coral reefs, described in the case above, is enabling coverage of previously uninsured risks, and helping clients build more resilient systems.
- Growing awareness among companies and investors that ocean risks are business risks illustrates the value of ocean data. It is estimated that US\$8.4 trillion of assets and revenues are at risk in a business-as-usual trajectory for the blue economy.²⁴ And 66% of publicly listed companies are exposed to, and to some degree dependent on, the need for a healthy ocean. Access to, and understanding of, ocean data will be key to investment decisions. As evidence of this: in 2024, multinational financial services firm

JPMorgan Chase & Co. hired the former chief scientist at the US National Oceanic and Atmospheric Administration as its global head of climate advisory.²⁵

Investor needs

- Knowledge of the field: The private financial sector tends to invest in areas it already knows and understands. For example, technology investors invest in technology; biomedicine investors invest in biomedicine. Most financial firms have limited familiarity with the blue economy, and have no dedicated ocean scientist in house.²⁶ This is a big reason why private blue investment has been slow to develop. Firms that have entered the blue space, like Propeller VC, have typically done so with teams of outside experts to advise them.



I’m not a chemist or physicist or biologist or other talented scientist. So the broader the set of experts we can draw on, the easier to validate that the science is headed toward solutions.

Steven Fox | Founding partner, Propeller VC²⁷

For more private investment to enter the blue economy, there is a need to raise the ocean literacy of the financial sector in general. That will not occur overnight, but changes are happening. Blue finance conferences are being held. Information products like newsletters and podcasts have emerged. A handful of exchange-traded funds focused on sustainable ocean practices have been built.

²³ Personal communication with Melissa Garvey, global director, Nature Bonds Program, The Nature Conservancy.

²⁴ WWF and Metabolic. 2021. Navigating Ocean Risk: Value at Risk in the Global Blue Economy. <https://wwfafrica.awsassets.panda.org/downloads/navigating-ocean-risk-2021.pdf>

²⁵ “JPMorgan rehires scientist Sarah Kapnick in climate push, memo shows”. Reuters. 21 October 2024.

²⁶ Credit Suisse. 2020. Investors and the blue economy. <https://www.esg-data.com/blue-economy>

²⁷ Personal communication with Steven Fox, founding partner, Propeller VC. 21 February 2025.

In the meantime, there are opportunities to attract investors from adjacent sectors. This is called crossover investing.²⁸ Biotechnology investors, for example, may be willing to invest in biotech projects in the ocean space to broaden their portfolio.



Most private investors are unfamiliar with the ocean. So translate what you do into language they understand. If you're working on aquaculture, you can say, 'This is about food security.' If you're working on wave energy, say, 'This is about infrastructure.'

Rick Wall | Director of external affairs, World Ocean Council²⁹

- **Controlling risk:** As discussed in the government section, risk is at the centre of any investment decision. Private investors seek to control their investment risk as much as possible –by obtaining the best data and information they can, and through de-risking instruments if available. Any de-risking of blue investment opportunities by government entities is generally welcomed by investors.
- **Financial returns:** Like government, the private financial sector wants to see the benefits of its investments. In private investors' case, this almost always involves financial returns. This is a novel conversation for many scientists, who may be inexperienced in financial concepts. The more financially literate the science

venture, the more likely a relationship can be built with investors.

- **Technological maturity:** Private investors tend to prefer investable technologies where a prototype has already been demonstrated in a relevant environment. This is referred to as Technological Readiness Level 6 or 7.³⁰ Lower readiness levels are more conceptual.

Opportunities

Once a unicorn company exists in the blue economy, we are likely to see a surge of private capital into the sector. It could even drive governmental spending in the sector, as SpaceX is credited with doing in the space sector.³¹ In the interim, here are opportunities to continue building private investment in the blue economy:

- Raising the ocean literacy of the financial sector via information tools, events, and the highlighting of deals and successful outcomes.
- Building more public-private partnerships to de-risk blue investments, including providing bridge funding to navigate the gap between scientific discovery and commercial application.
- Improving data availability and standardised metrics to support investment decision-making.
- Replicating tools like nature bonds, which provide safe and secure returns for private investors as well as positive ocean outcomes.

²⁸ Janulis and Keller. 2025. "Unlocking Green Tech Capital for Blue Economy Ventures." GreenMoney.

²⁹ Personal communication with Rick Wall, director of external affairs, World Ocean Council (WOC). 27 February 2025.

³⁰ Ibid.

³¹ Personal communication with Claire Jolly, head, Ocean Economy & Space Economy, OECD. 26 February 2025.

C. Philanthropic and NGO investment in ocean science

Global philanthropic funding of ocean projects totalled US\$1 billion in 2022, doubling since 2010.³² Over that 12-year period, the top three areas of philanthropic funding were science initiatives (26%), fisheries and aquaculture (21%), and protected areas and habitat protection (20%).

Additionally, NGOs are estimated to have invested US\$840 million in ocean projects in 2022.³³

However, the combined philanthropic and NGO investment in ocean issues in 2022 still represented less than 1% of global philanthropic funding that year. In comparison to the other sectors in this paper, philanthropic/NGO funding of ocean science is less than that of governments, and roughly equal to the private financial sector.

Still, philanthropic and NGO funding is a dynamic and productive space. In most cases, it is unbound by government's public obligations or private investors' need for financial returns; it is free to pursue outcomes sought by each philanthropic institution's board. Philanthropies are more willing to invest in early-stage innovations and solutions, and in a mix of basic science and applied science. (Although most philanthropic investments in ocean science are for applied research, the David and Lucile Packard Foundation – the largest philanthropic investor in ocean projects – spends roughly US\$50 million a year on basic ocean science alone, through its support for the Monterey Bay Aquarium Research Institute.)³⁴ And as the two cases in this section show, some of the most innovative solutions to sustainable ocean management in recent years – in terms of finance and technology – have emerged from the philanthropic and NGO realm.

³² Sea Around US / CEA Consulting. 2023. *Funding Trends 2023: Tracking the State of Global Ocean Funding*. <https://oursharedseas.com/wp-content/uploads/2023/12/oss-global-ocean-funding-report-2023.pdf>

³³ Ibid.

³⁴ Personal communication with Walt Reid, former vice president of environment and science, David and Lucile Packard Foundation. 23 February 2025.

Case 4: Converting sovereign debt to large-scale marine conservation

Location: Bahamas, Barbados, Belize, Ecuador, Gabon, Seychelles

Partners: The Nature Conservancy; national governments; multilateral development banks; commercial banks; others

Finance mechanisms: Debt conversion

Science involved: Ecological analysis; design of marine protected areas

Background: The Nature Conservancy has pioneered the use of what it calls Nature Bonds projects. These combine debt conversions with technical assistance in science, planning, and policy – helping governments to finance and implement ambitious conservation and climate outcomes. The projects enable countries with substandard credit to refinance their existing debt at better rates, thanks to a credit enhancement by development banks like the Inter-American Development Bank, or development finance institutions like the US Development Finance Corporation. The resulting savings are then converted to long-term financing for conservation, with the countries implementing specific environmental protection measures with the funds.

Investors in the refinanced debt receive competitive financial returns while funding measurable conservation progress. By mobilising private capital markets toward conservation goals, Nature Bonds projects address the significant funding gap that has historically undermined large-scale environmental protection and management. For example, a Nature Bond project in the Bahamas, announced in 2024, is projected to secure US\$124 million for the country's ocean conservation over the next 15 years, including for management of its marine protected areas.

The Nature Conservancy has six Nature Bonds projects in implementation so far – in Seychelles (2016), Belize (2021), Barbados (2022), Gabon (2023), Ecuador (2024), and the Bahamas. All but Ecuador's have focused on marine ecosystems. Each project features a collaboration of financial institutions, government agencies, and local stakeholders, and is tailored to the country's ecological priorities and fiscal circumstances. The Bahamas Nature Bond project involved The Nature Conservancy, Inter-American Development Bank, Builders Vision (a private credit enhancer), insurer AXA XL, and multiple investors.

Benefits:

- Finance for large-scale marine planning, conservation, and management
- Refinancing of existing sovereign debt load
- Competitive financial returns and conservation impact for investors



Roughly 88% of 'last chance ecosystems' – places that are highly important but critically endangered – are in countries that also face moderate to high levels of debt distress. For these countries to survive, their option has typically been extractive activities. Nature Bonds projects offer a different path.

Melissa Garvey | Global director, Nature Bonds Program, The Nature Conservancy³⁵

³⁵ Personal communication with Melissa Garvey, global director, Nature Bonds Program, The Nature Conservancy. 28 February 2025.

Opportunities

Ocean science financed by philanthropies and NGOs has produced many of the advances in marine protected area science and related spatial planning in the past 20 years, including on optimal design and regulations. That science is now supporting governments in their efforts to meet national and international conservation goals, like the UN Convention on Biological Diversity's 30 x 30 target for marine protected areas.

In regularly facing the gap between the funding needed and funding available for adequate ocean management, philanthropies and NGOs have initiated innovative solutions to it. With particular relevance to the Global South, these include:

- Nature Bonds projects (see the case above), which offer an elegant solution for countries that otherwise might be inclined to sacrifice their endangered ecosystems to address debt distress.
- Tech tools like Skylight – developed by the Allen Institute for Artificial Intelligence, a philanthropy – which offers a powerful yet low-cost and long-term solution to help SIDS and LDCs monitor their remote waters (page 18).

Philanthropic and NGO needs

Ocean literacy is often higher among philanthropies and NGOs – with the ocean as their focus – than it can be in government and the financial sector. So the issue of “different languages” that sometimes obstructs conversations between scientists and the latter sectors is not as much of a factor with philanthropies and NGOs. However, philanthropies and NGOs still have needs for scientists to consider:

- Specific interests: Each philanthropy and NGO has its own interests and goals, so securing its investment requires careful research before framing the pitch. This is similar to pitching a business deal (in fact, it is a business deal). But it is a different approach for ocean scientists who are used to directing their funding requests to standard government calls.

Relatedly, the building of personal relationships between grantor and grantee can be invaluable for securing long-term investment. Again, this can be similar to business deals, but is a departure from standard government funding for ocean science.³⁶



Securing non-governmental funding depends critically on building a relationship with a foundation or other sponsor. Most scientists are not trained to do that.

Hilairy Hartnett | Director, University of Washington School of Oceanography³⁷

- Applied science: Although a few philanthropies do invest significantly in basic science, most of them are focused on applied science, and applied science has driven most of the discoveries in marine conservation of the past two decades. Nonetheless, this can be of concern to oceanographers and other physical scientists who view government-financed basic science – funded by a party that ideally is not invested in the outcome – as the only way to avoid potential biases in their work.

³⁶ Personal communication with Hilairy Hartnett, director, University of Washington School of Oceanography. 18 February 2025.

³⁷ Ibid.

Opportunities

The relative openness of the philanthropic/NGO sector to new approaches allows for the support and testing of creative instruments and solutions.

- **More philanthropists:** Several of the largest foundations in the ocean science field were formed by philanthropists who earned their fortunes in the technology sector. This yields a natural relation between their philanthropy and a culture of innovation, which is often exhibited in their investments. As industry's use of ocean data grows, it may be likely that more philanthropists will enter the ocean field, adding greater

support for innovative solutions to ocean challenges.

- **Partnering with the financial sector:** Financially sophisticated NGOs are developing new tools that not only address their interests but meet the needs of supportive partners, including in the financial sector. In some ways – as in the nature bond example – NGOs are serving as liaisons between the financial sector and ocean management. This is unlocking private investment that otherwise would not flow to the marine field. More partnerships between NGOs and the financial sector can continue to address the persistent shortage of funding for ocean science.

Case 5: Using AI to strengthen the global south's maritime awareness

Location: Global South

Partners: Allen Institute for Artificial Intelligence; International Union for Conservation of Nature (IUCN); Global South countries

Finance mechanisms: No-cost use

Science involved: Artificial intelligence

Background: Skylight is a software solution that empowers the visualisation and analysis of vessel behaviour at sea – strengthening governments' maritime awareness and enabling more effective enforcement against illicit fishing. Developed by the not-for-profit Allen Institute for Artificial Intelligence (Ai2), Skylight combines AI with free and commercial data sources from multiple satellite systems. The result: a seamlessly integrated and automated platform that can track vessels even when they've gone "dark".

In 2023, Ai2 partnered with IUCN to make Skylight available to all Global South countries at no cost. This was in response to the signing that year of the UN High Seas Treaty, and was aimed at ensuring equitable implementation of the treaty in the Global South and beyond. (Through the partnership, countries could also receive technical assistance, capacity building, and policy advice from IUCN.) Organisations in over 70 countries now use Skylight for maritime surveillance.

Ai2 is largely self-funded. The openness of its data is intended as a correction to market failures related to long-term environmental enforcement in developing countries. However, Ai2 welcomes the potential use of its data by entities for commercial purposes (e.g., risk and insurance products) to serve markets that could support ocean health in ways beyond Ai2's philanthropic mission.

Benefits:

- Long-term, low-cost maritime awareness and security
- Improved ecosystem management
- Commercial opportunities for mission-aligned companies



If countries don't have a clear idea of how they're going to afford to monitor their remote ocean areas in the long term, then many of them will simply refuse to designate a marine protected area there. We wanted to provide a solution. Skylight gives them a powerful and affordable tool that they can build into their long-term management and monitoring plan.

Ted Schmitt | Senior Director, Conservation, Allen Institute for Artificial Intelligence³⁸

³⁸ Personal communication with Ted Schmitt, senior director, Conservation, Allen Institute for Artificial Intelligence. 18 February 2025.

3 Analysis and conclusion

Ocean science is underfunded and receives most of its investment from governments. But there is growth in investments from the financial sector and philanthropic sector, and recent innovations in technology and finance indicate there may be significant room for continued growth, particularly from the latter sectors.

The benefits of investing in ocean science have been abundant:

- Investments from government have built observing systems whose data underpin much of the world's weather forecasting and climate risk assessments.
- Investments from philanthropies and NGOs have formed much of the world's understanding of marine conservation science.

And although investments from the financial sector represent just a small fraction of the global blue economy, its partnerships with the other sectors have been promising, namely via de-risked instruments with governments and innovation with NGOs, as indicated by cases in this paper.

For ocean science projects to meet the investment needs of governments and philanthropies, they largely must show how the science will be applied to address the funders' interests. This is not a high barrier but does require an openness to applied science and to tailoring projects to a funder – particularly if the funder, like a politician, must mind other funding priorities beyond just ocean science.

Meeting the needs of the financial sector is more challenging. Projects must show relevance to the specific investing experience of the investor; must offer positive financial returns; and, if involving a new technology, must typically have an already demonstrated prototype. These are significant hurdles for investment. Yet, the financial sector represents an enormous potential source of investment capital for ocean science. If an ocean science project is able to meet the sector's needs, the door should open.

Strengthening the case for investment

There is ample evidence to argue for greater investment in ocean science, as indicated by the cases herein. And, among governments and business, the growing awareness of ocean data's value for assessing economic risk from climate change should drive more investment over time.

It is perhaps a truism that evidence of the benefits of investing in any sector is key to steering investment there. Without knowledge of the benefits, investment has little incentive to engage.

Yet, as described in this paper's introduction, evidence of benefits from investing in ocean science is currently not generated, reported, nor analysed in a consistent or transparent way. This lack of data-gathering presents a barrier to greater investment. Potential knowledge of the benefits of ocean science investment, and blue investment in general, is effectively lost rather than shared and applied.

A call for standardisation

The new UNESCO-IOC initiative for which this position paper was prepared proposes that there is a need for a standardised framework to gather and disseminate this information: not only on the nature of ocean science deals (Who is investing? Which types of ocean science? How are the deals structured?) but what goals were met and what the quantitative and qualitative returns were. Through such standardisation, a stronger, more consistent, and more transparent argument can be built for ocean science investment.

The framework would generate comparable and clear data on the benefits of investing in ocean science. Such solid information would strengthen arguments for increased funding where it's most needed, and help decision-makers understand true costs and benefits. It would also increase access to financing by providing reliable data for funding requests from international financial institutions.

The framework is viewed as more than simply a database. It could also be a tool to raise awareness of the ocean's value, to build ocean literacy more broadly, and to encourage more communication among current and potential investors in the space.

“ There is fairly poor coordination among investors in the ocean field. We would benefit from more straightforward communication about what we're working on.

Steven Fox | Founding partner, Propeller VC³⁹

Just as importantly, it could provide cases and success stories.



If there were a compilation of stories about how investments in science have contributed to conservation outcomes, or climate benefits, or greater economic return for society – those would be invaluable.

Walt Reid | Former VP for environment and science, David and Lucile Packard Foundation⁴⁰



We need more case studies on ocean science investment.

Claire Jolly | Head, Ocean Economy & Space Economy, OECD⁴¹

Further details on what the standardised framework could entail will be discussed at the World Ocean Summit in Tokyo, Japan, in March 2025, and at the 2025 United Nations Ocean Conference (UNOC) in June. A revised version of this paper will be prepared to integrate input generated during discussions in Tokyo, and additional knowledge products will be developed to share findings and otherwise advance the initiative.

Furthermore, in the lead-up to UNOC, the UNESCO-IOC initiative will establish a partner coalition across Member States, industry, and philanthropy to advise the design and eventual implementation of the standardised framework. UNESCO-IOC and IHO call on interested partners to ask for more information and to join this coalition.

The future of ocean science investment depends on making clear its value to the economy, to society, and to the institutions that invest in it. We propose this standardised framework would help clarify that value, and would help accelerate wise and successful investment in ocean science.

³⁹ Personal communication with Steven Fox, founding partner, Propeller VC. 21 February 2025.

⁴⁰ Personal communication with Walt Reid, former vice president of environment and science, David and Lucile Packard Foundation. 23 February 2025.

⁴¹ Personal communication with Claire Jolly, head, Ocean Economy & Space Economy, OECD. 26 February 2025.

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