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The Blue Bond Market: A Catalyst for Ocean and Water Financing

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Abstract: The blue bond market has emerged as one of the latest additions in the sustainable debt market. Its goal is to channel funding toward sustainable blue economy projects related to the ocean and freshwater. While the protection of hydric resources has gained importance within the problem of climate change, Sustainable Development Goals linked to water remain the most underfunded. Since the issuance of the first blue bond in the Seychelles in 2018, multiple public and private organizations have turned to the blue bond market to raise funds. However, unlike the green bond market, no comprehensive market overview exists, preventing stakeholders from judging whether this label has been effective in protecting water resources and drawing conclusions on its future potential. This paper draws on an extensive review of academic research and complements it with a unique and comprehensive analysis of blue bonds issued to date, providing a contribution to the literature on sustainable finance. Between 2018 and 2022, 26 blue bond transactions took place, amounting to a total value of USD 5.0 billion, with a 92% CAGR between those years. Currently, blue bonds represent less than 0.5% of the sustainable debt market. The use of proceeds has mostly focused on waste management, biodiversity, and sustainable fisheries, but also ranges across other areas of the sustainable blue economy. Only two-thirds of blue bond issuers report on impact metrics, providing further opportunity to add detail and rigor. We draw comparisons to the more mature green bond market and conclude that a lack of standardized definitions, metrics, and expertise by issuers and investors are significant barriers to the blue bond market. Resolving these barriers is crucial to attract corporations and ensure continued growth of the blue bond market.

Keywords: blue finance; blue economy; blue bonds; green bonds; sustainable finance; sustainable investing; ESG

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1. Introduction

Since the first blue bond was issued by the Republic of Seychelles in 2018, blue bonds have been frequently recognized as instruments to increase financing flows toward a sustainable blue economy (Sumaila et al. 2021; Thompson 2022; UN Global Compact 2020a). As the most underfunded Sustainable Development Goal (SDG), SDG14 (Life below water) is in significant need of capital and has poor prospects of achieving the set targets by 2030 (Nash et al. 2020; OECD 2019).

Blue bonds are debt instruments that finance the protection of critical clean water resources, as well as marine and ocean-based projects with positive environmental and social benefits (World Bank 2018c). While green bonds have been extensively researched and reported on (Banga 2019; Bhutta et al. 2022; Flammer 2021; Maltais and Nykvist 2020), there is currently no comprehensive overview of the blue bond market. This lack of analysis has multiple negative effects on the blue bond market. First, the lack of a clear framework hampers the growth of investments and policies that can develop the blue bond market (Sumaila et al. 2021). Second, it prevents the further development of practical guidelines for NGOs and private companies to get involved (Shiiba et al. 2022). Third, it reduces the "thematic legitimacy" of blue bonds, given the ambiguity over whether solely sustainable

projects are funded with blue bond proceeds (Thompson 2022). Finally, related to this, it increases the risk of "bluewashing", which occurs when issuers or brokers misrepresent the environmental benefits of securities (Mathew and Robertson 2021; Thompson 2022), a risk observed in the green bond market as well (Borio et al. 2022).

The aim of this paper is to provide a comprehensive overview of bonds that are associated with the blue bond concept, contributing to the literature on sustainable finance. We first briefly summarize the economic and environmental case for ocean financing based on the latest literature (Johansen and Vestvik 2020; Shiiba et al. 2022). By doing so, we contribute to synthesizing the logical arguments for investing in the ocean's health that can resonate with public and private actors, which are critical enabling conditions to invest in blue financing and SDG14 (Johansen and Vestvik 2020; Sumaila et al. 2021). Next, we provide a comprehensive review of the current state and existing practices in the blue bond market. Our goal is to increase awareness of this innovative market and contribute to reaching a consensus of where blue bond proceeds can be invested, as well as how their impact can be measured and monitored. By doing so, we hope to help develop a clear framework to support the long-term success and legitimacy of the blue bond market.

To achieve this, we have conducted an extensive review of academic research, practitioners' reports, and press releases. Based on our findings, we have compiled a list of 26 blue bonds that were issued between 2018 and 2022. Our analysis includes examining the size of the market, the market actors, bond duration, bond coupons, use of proceeds, and impact metrics. We also draw comparisons between these characteristics and those of the more mature green bond market and provide recommendations for further development of the blue bond market.

Our key recommendations include the establishment of unified guidelines, in line with the expected release of a blue bond guidance by established market actors such as the International Capital Market Association (ICMA) and the United Nations (UN) Global Compact. Additionally, we highlight the need for greater transparency and accountability in blue bond reporting.

In Section 2, we provide an overview of sustainable bonds, including green bonds. Section 3 examines the current definition of blue bonds, makes the case for financing related to the theme of water, draws a potential connection between water bonds and blue bonds, and provides an overview of the latest literature. In Section 4, we describe our research methodology and important parameters regarding the scope of this research. Section 5 provides an overview of the blue bond market, including size, actors, use of proceeds, and impact metrics. Finally, in Section 6, we synthesize our findings and conclude with recommendations for the growth of the blue bond market, particularly in attracting corporations and banks.

2. Sustainable Bonds

2.1. Bonds as a Financial Instrument

Bonds are debt securities that enable entities to borrow money from investors for a specified period. Typically traded over the counter or on a stock exchange, bonds are issued by corporations, non-federal governments, or the U.S. Department of Treasury, depending on the type of bond. Companies may issue bonds to obtain funding, increase cash flow, refinance debt, or invest in projects (SEC n.d.). Compared to bank loans, bonds often offer less-expensive capital (Smith 2022). Meanwhile, investors may prefer bonds as they can provide a predictable income stream and tend to be less volatile than stocks. Assuming the issuing entity fulfills its obligations, bonds also preserve the nominal capital invested (SEC n.d.).

2.2. Sustainable Bonds as an Emerging Debt Category

The universe of debt instruments has seen the emergence of sustainable bonds as a new category. The first green bond was issued in 2007 by the European Investment Bank (n.d.), and since then, the field has grown exponentially (Figure 1).

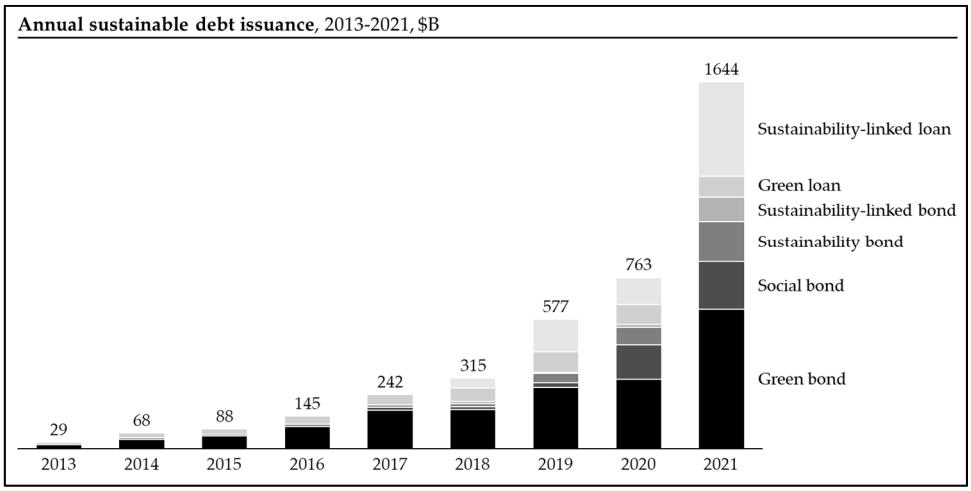

Figure 1. Annual sustainable debt issuance, 2013–2021. Source: adapted from Bloomberg New Energy Finance (2021).

In 2021, the total issuance of sustainable debt reached USD 1.6 trillion, of which almost 70 percent, or more than USD 1.1 trillion were issued through bonds (Bloomberg New Energy Finance 2021). The growth in sustainable finance can be attributed to rising demand from asset owners and increasing regulatory pressure to properly label what is sustainable (Redondo Alamillos and de Mariz 2022).

While the sustainable debt market has grown significantly in recent years, it is still smaller compared to the global traditional debt market (Deschryver and de Mariz 2020) and the total financing required to reach the SDGs (Lagoarde-Segot 2020). Nonetheless, sustainable finance presents a significant opportunity for capital markets, in particular in emerging markets (de Mariz 2022).

Bloomberg New Energy Finance (2021) tracks four types of sustainable debt instruments: green bonds, social bonds, sustainability bonds, and sustainability-linked bonds, all of which align with the "Principles, Guidelines and Handbooks" issued by the International Capital Market Association (ICMA 2021). These instruments can be divided into two subcategories: sustainability-linked bonds and use of proceeds bonds. According to the ICMA (2020), sustainability-linked bonds are "any type of bond instrument for which the financial and/or structural characteristics can vary depending on whether the issuer achieves predefined Sustainability/ESG objectives". Sustainability-linked bond issuers explicitly commit to "future improvements in sustainability outcome(s) within a predefined timeline", making them "forward-looking performance-based" instruments (ICMA 2020). On the other hand, use of proceeds bonds comprise the green, social, and sustainability bonds, each with a different definition. Green bonds, for instance, fund environmental projects. Their proceeds are used "exclusively to finance or refinance, partially or in full, new and ongoing green projects, in particular, infrastructure investments" (Deschryver and de Mariz 2020). Green bonds differ from traditional bonds, in that corporations must report on their use of proceeds for green projects. Use of proceeds bonds also differ from sustainability-linked bonds because they lack the link between forward-looking key performance indicators (KPIs) and the bond's interest payments. Finally, social bonds and sustainability bonds are variations on use of proceeds bonds and were first issued in 2010 and 2012, respectively. Social bonds raise capital aimed at social benefits such as affordable housing (Park 2018), while sustainability bonds target a combination of social and environmental benefits (Mocanu et al. 2021).

3. Blue Bonds: A New Type of Sustainable Bonds

3.1. Definition

Blue bonds are recently introduced and innovative sustainable debt instruments (Jouffray et al. 2021; Sumaila et al. 2021), with the first blue bond being issued in 2018. As Suzanne Johnson, senior advisor to the UN Global Compact's Sustainable Ocean Business platform, stated: "blue bonds are where green bonds were 10 years ago, in terms of being at a nascent stage, but poised for take-off" (Gambetta 2021). As a result, there is currently no standardized definition of blue bonds (Requicha Ferreira 2022), and various organizations have developed their own definitions to describe them.

The World Bank (2018c) defines a blue bond as "a debt instrument issued by governments, development banks or others to raise capital from impact investors to finance marine and ocean-based projects that have positive environmental, economic and climate benefits". The World Bank's definition is based on the concept of the blue economy, which refers to "sustainable use of ocean resources for economic growth, improved livelihoods, and jobs while preserving the health of ocean ecosystem". This view on a broad spectrum of sea- and ocean-related economic activities with social, environmental, and economic impact is also shared by Mathew and Robertson (2021). In contrast, the International Finance Corporation, IFC (2022c), characterizes blue bonds as "innovative financing instruments" that provide funding for both ocean-based projects and "critical clean water resources protection". Meanwhile, the UN Global Compact (2020b) states that blue bonds can "include sovereign, project, and corporate bonds" and focus on "investments within marine conversation and restoration, [. . .] water-related infrastructure [. . . that can] "positively impact the ocean and support sustainable development". UNEPFI (2021b) takes a more focused approach in its blue finance reports, mentioning industries such as seafood, shipping, ports, coastal and marine tourism, and marine renewable energy. The Asian Development Bank shares this perspective but also includes pollution control projects and ecosystem management in this scope (Asian Development Bank 2021b, 2022b).

The space of sustainable debt has yet to come to a consensus on the place of blue bonds. While the IFC (2022c) explicitly states that blue bonds should follow the ICMA's Green Bond Principles, others believe "blue sustainability-linked bonds" could exist (Requicha Ferreira 2022). However, as explored in Section 5, all publicly available blue bonds issued so far have been use of proceeds bonds. To address this lack of common definition, the IFC, ICMA, UN Global Compact, UNEP FI, and Asian Development Bank are developing a unified guide for bonds to "finance the sustainable blue economy" (IFC 2022f). This guide will draw on the definitions put forward in the aforementioned guidelines and frameworks. At present, we define blue bonds as a sub-category of green bonds—use of proceeds debt instruments that fund the protection of critical clean water resources and marine and ocean-based projects that have positive environmental and social benefits.

3.2. The Case for Ocean Financing

Blue bonds have emerged as a crucial tool to attract investments into ocean financing around the globe (Roth et al. 2019). The importance of investing in a sustainable blue economy has become increasingly clear from three different perspectives. First, the ocean, climate change, and sustainability are inherently interconnected, and investing in the blue economy can help address these critical issues (Shiiba et al. 2022). Second, there is a significant funding gap for the blue economy, and blue bonds can help to close this gap by attracting investors (Tirumala and Tiwari 2022). Finally, the economic potential of the oceans is immense, and investing in the blue economy can lead to new opportunities for growth and development (Konar and Ding 2022).

3.2.1. Interlinkages between the Ocean, Climate Change, and Sustainability

Seas and oceans are of immense importance to the Earth, covering over 70 percent of its surface and providing a vast array of benefits to humanity. They support a large source of biodiversity, while providing food or income to more than 3 billion people globally.

Additionally, oceans produce half of the Earth's oxygen and absorb 90% of excess heat produced by human activity (World Bank 2022a). They also absorb more than a quarter of carbon dioxide (CO_2) emissions (Gattuso et al. 2018). Ocean and coastal ecosystems such as mangroves, tidal marshes, and seagrass meadows all have higher carbon sequestration and storage capacity per unit area than forests (World Bank 2022a). Oceans could reduce greenhouse gas emissions by 11 billion tons per year by 2050 and close the "emissions gap" to reach the 1.5 °C pathway by a fifth (Hoegh-Guldberg et al. 2019). Therefore, oceans are crucial in mitigating and adapting to climate change.

However, the ocean's health is being threatened by climate change itself, creating a vicious cycle. Indeed, climate change is "driving unprecedented changes that severely affect ocean health, and the ocean's ability to sustain the flow of ecosystem goods and services upon which human and societal well-being depend" (Sumaila et al. 2021). Diminished ocean health leads to a lower capacity to capture carbon emissions, exacerbating the impacts of climate change. Significant modifications in the ocean, including "temperature increase, sea level rise and acidification" (World Bank 2022a), are directly impacting the ocean's absorbing capacity and the capacity of species within it. The rise in sea levels has also increased the frequency of wetland flooding, erosion, and farmland contamination (Tirumala and Tiwari 2022). Furthermore, direct human activity has led to the deterioration of ocean health through marine littering, destructive fishing practices and overfishing, direct habitat damage, and deep-sea mining (Mathew and Robertson 2021; Sumaila et al. 2021). Indeed, overfishing and changes in land and sea use have caused the largest negative impacts on marine ecosystems in the last five decades (Díaz et al. 2019).

Both human-induced climate change and marine ecosystem damage pose severe risks to the sustainability of the ocean with disproportionate effects on people living in coastal areas. For instance, the National Oceanography Centre (2018) estimates that rising sea levels could cost USD 14 trillion per year by 2100, with threats concentrated in upper-middle-income countries. Furthermore, the IPCC predicts severe effects on food security and the economic value of the ocean for marine resource dependent communities, especially in the tropics. Finally, marine ecosystem loss and degradation put the ocean's value for culture and recreation at risk (Sumaila et al. 2021).

3.2.2. Lack of Funding

Ocean financing plays a critical role in maximizing the ocean's sustainability and mitigating the threats to the ocean's health (Sumaila et al. 2021). Despite the ocean's crucial importance for climate change mitigation and adaptation and the world's economy, ocean financing has not received adequate attention (Johansen and Vestvik 2020; Thiele and Gerber 2017). In 2019, SDG14 (Life below water) received the least funding among all SDGs. Only USD 2.3B (0.6%) out of USD 359.4B funding was allocated to ocean financing (OECD 2019). In addition, only 2% of blended finance transactions address SDG14—the second least among all SDGs—compared to 16% for SDG13 (Climate action) (Dembele et al. 2022). By comparison, SDG6 (Clean water and sanitation) received USD 16.3B, or just under 5% of the total amount of Official Development Assistance (ODA) financial flows (OECD 2019).

Furthermore, there is wide agreement that there is additional potential for private-sector investments in SDG14 (Johansen and Vestvik 2020). SDG14 is the least visible goal for the world's largest companies, and hence, limited private-sector commitments exist to contribute to SDG14 (Schatz 2017). As a result, current funding allocated to SDG14 is insufficient to meet the funding requirements estimate to achieve the SDG goals set by 2030. Johansen and Vestvik (2020) estimate that a total of USD 155.7B is required to implement SDG14 by 2030. However, as of now, only 2% of countries are on track to achieve this goal (Nash et al. 2020).

3.2.3. Economic Potential of the Oceans

Investing in sustainable oceans has immense economic and social potential. According to the OECD (2016), the global ocean economy was worth USD 1.5 trillion in 2010, equivalent to

5–6% of the global "real economy". By 2030, this figure is expected to double to USD 3 trillion. Furthermore, the ocean economy employed 31 million people in 2010. In addition, the total value of key ocean assets, including "direct ocean output, trade and transport, productive coastline and carbon absorption" is estimated at USD 24T (WWF 2015).

Researchers have found that investing USD 2–4 trillion in sustainable oceans could yield net benefits of USD 8–23T over the next 30 years across four ocean transformations, namely "conservation and restoration of mangroves, decarbonization of international shipping, sustainable ocean-based food production, [and] offshore wind energy production" (Konar and Ding 2022). This implies benefit–cost ratios of between 3:1 and 12:1. Other blue economy industries such as tourism and recreation, coastal protection and conservation, and marine-oriented science sectors also offer benefits (Mathew and Robertson 2021).

Finally, blue carbon solutions have shown potential in terms of both climate change mitigation and financial returns. Currently established solutions can achieve an abatement of 0.4–1.2 $GtCO_2$ (1–3% of current annual emissions), and with emerging and nascent solutions, this figure could increase by an additional 4–5 $GtCO_2$ of abatement potential. One-third of the total abatement potential would have a marginal cost of abatement below USD 18 per tCO_2. This shows economic potential, given the average price paid in the European markets was between USD 14–100 per tCO_2 in 2021 (Claes et al. 2022).

These findings have led 72% of asset managers and asset owners to believe that the sustainable blue economy is an investable theme. In addition, 65% of asset managers believe that blue economy investments would have positive effects on financial performance. That said, the main barriers include lack of "investment-grade projects / firms at scale", "not enough internal expertise" and "lack of definition" (Credit Suisse, and Responsible Investor Research 2020). Developing a blue bond market could help to alleviate these barriers.

3.3. Freshwater Conservation and the Connection between Blue Bonds and Water Bonds

Although there is no consensus on whether freshwater conservation should be included in the definition of blue bonds, there are clear reasons why addressing both freshwater and oceans conservation in a synergistic manner is important. For instance, 80% of plastic waste in our oceans comes from land-based sources and is transported to the oceans through rivers (Li et al. 2016). In addition, land-based activities created "excess sediment and nutrient runoff [which] are considered serious threats to coastal and marine ecosystems" (Fredston-Hermann et al. 2016). This interconnectedness is also reflected in the SDGs. Target 14.1 (related to reducing marine pollution) has several strong links with SDG6 (Clean water sanitation). Indeed, Berggren and Liss Lymer (2016) argue that indicators 6.3.1 ("Proportion of wastewater safely treated"), 6.3.2 ("Proportion of bodies of water with good ambient water quality"), and 6.5.1 ("Degree of integrated water resources management implementation") have a directly enabling and unidirectional link for achieving target 14.1. Furthermore, Le Blanc et al. (2017) argue that these links potentially have transboundary effects, highlighting the international character of freshwater and ocean conservation.

Water investments have a compelling economic case, similar to ocean financing. The OECD (2022) argues that strategic water investments could bring benefits "exceed[ing] hundreds of billions of dollars annually". This is driven by the current economic losses caused by water insecurity, which add up to almost USD 500 billion per year across water supply and sanitation, flooding, and water insecurity. As a result, water-related risks are financially material. The Dutch Central Bank estimates that almost 20% of the assets held by the Dutch financial sector are exposed to water stress. This figure increases further when looking at industries that require vital access to water, such as agriculture and mining (OECD 2022).

Despite the compelling economic case for water investments, the current investment levels are insufficient to achieve "universal and equitable access to safe and affordable drinking water for all by 2030" (OECD 2022). The estimated investment required to achieve this goal is USD 1.7 trillion in present value, but current investments are nearly 70% lower

than that (OECD 2022). In addition, Winpenny (2015) estimates that USD 22.6 trillion in water infrastructure investments will be required by 2050.

Water bonds have been leveraged to target water investment and, unlike blue bonds, have reached a significant market size. The State of California has issued nine water bonds for a total of USD 2.9 billion between 1970 and 1997 (LAO 2000) and has increased this figure to USD 27 billion in the last two decades (Rosser and Chappelle 2021). In the Netherlands, NWB Bank (2021) has issued 12 water bonds worth EUR 5.7 billion between 2014–2021. The water bond market benefits from an industry-wide accepted standard, unlike blue bonds. The Climate Bonds Initiative launched the "Water Infrastructure Criteria under the Climate Bonds Standard" in 2016 (Climate Bonds Initiative 2021). Given the parallels and synergies between water and ocean financing, it may be sensible to treat water bonds and blue bonds under the same umbrella in the long run. However, currently, both markets are treated separately, given the blue bond space is much less mature than the water bond space.

3.4. Blue Bonds for Ocean and Freshwater Financing: Current State of the Literature

Despite the importance of ocean and freshwater financing, the current literature on blue bonds and blue finance in general is limited. Most blue bond papers only discuss single case studies, providing limited insights into the potential of blue bonds as a financing mechanism for global ocean and freshwater sustainability. Althalet et al. (2021) discuss the potential and barriers of issuing blue bonds in Indonesia, while Gonzalez-Ruiz et al. (2019) discuss the potential of including blue bonds in a financing structure for a wastewater treatment plant. March et al. (2023) discuss blue bonds to support the sustainable blue economy in the Bahamas. Furthermore, some studies attempt to approach the blue bond market as a whole, but their insights may be limited by the small number of issued blue bonds they draw from. Requicha Ferreira (2022) introduces blue bonds as a new concept by drawing on examples of bonds issued in the Seychelles, by the Nordic Bank, and by the Bank of China. Thompson (2022) provides an extensive review of the blue bond market's financial and environmental impact, but only draws insights from five issued and two planned blue bonds. Finally, several studies (Jouffray et al. 2019; Roth et al. 2019; Shiiba et al. 2022; Sumaila et al. 2021; Tirumala and Tiwari 2022) discuss blue bonds in the broader context of blue finance or ocean sustainability. Below, we provide an overview of the current literature across the blue bonds' use of proceeds, use of impact metrics, size and participants, and financial impact.

3.4.1. Need for Clarity on Definition and Use of Proceeds

The current literature on blue bonds highlights the need for standardization of the definition and use of proceeds of the blue bond market (Roth et al. 2019; Shiiba et al. 2022; Sumaila et al. 2021; Thompson 2022). Private-sector actors govern and self-regulate the labeled bond market, creating ambiguity (March et al. 2023). Standardizing the blue bond market has the potential to address several concerns that have been raised by scholars. By providing clear guidance and standards, barriers preventing NGOs, private investors, and issuers from participating can be reduced, which can help develop the market further (Shiiba et al. 2022). Furthermore, a clear blue taxonomy can attract the required investments toward a sustainable blue economy (Sumaila et al. 2021), while clear definitions can address potential conflicts between environmental and financial returns and support the "thematic legitimacy" of blue bonds (Thompson 2022). Finally, standardization can reduce the risk of "bluewashing", which occurs when issuers and actors overstate the positive environmental impact of the blue bonds (Mathew and Robertson 2021; Thompson 2022). Thompson (2022) and March et al. (2023) indicate that the risk of "bluewashing" is linked to the ambiguous distinction between the blue economy and SDG14. The former includes unsustainable extractive industries such as seabed mining (Thompson 2022), while blue bonds should be restricted to a sustainable blue economy (March et al. 2023). This aligns with the "five tipping points" for ocean health proposed by the UN Global Compact (2019).

3.4.2. Impact Metrics as an Enabler for Sustainable Ocean Development

Robust metrics can enable financing toward sustainable ocean development (Sumaila et al. 2021). Well-designed metrics can provide clarity on the blue bond's impact and performance. Moreover, they can help investors to standardize their investment approaches and to compare blue bonds against each other (Roth et al. 2019). As such, impact metrics and monitoring should be at the core of the blue bond design (Roth et al. 2019). Thompson (2022) states that current blue bond issuers currently "cherry pick" the environmental impacts they report on. Accordingly, they pass off the impact as more meaningful than it is. Thompson (2022) critiques the lack of detail and robustness of the impact metrics utilized by blue bond issuers. Therefore, he argues for "far greater to disclosure on blue bonds and the projects they finance [. . .] to validate their sustainability" (Thompson 2022).

One way of ensuring robustness of impact is by standardizing the metrics that are being reported on (Roth et al. 2019). Several areas, such as renewable energy and wastewater management, already have commonly adopted impact areas. Other areas have more heterogeneous impact metric approaches, such as ocean conversation or restoration. For these, Roth et al. (2019) propose a list of standardized metrics with a focus on impacted area size or beneficiary count. Finally, Roth et al. (2019) suggest using the blue carbon impact as the primary multi-purpose yardstick for virtually all blue bond investments, given most projects either "reduce, avoid or sequester GHG emissions".

Well-designed and standardized metrics will help draw conclusions on whether blue bonds issuers improve their environmental performance, as was previously studied in the green bond market (Flammer 2021).

3.4.3. Blue Bond Issuance Size and Participants

While the size of the blue bond market remains unquantified in the literature, it is frequently referenced in discussions regarding the importance of private-sector involvement. The current limited participation of private investors in the market is attributed to the small issuance sizes and the lack of a well-established market (Gonzalez-Ruiz et al. 2019; Roth et al. 2019; Sumaila et al. 2021). Nonetheless, the involvement of private investors is considered a significant priority for ocean sustainability (Jouffray et al. 2021; Shiiba et al. 2022; Thiele and Gerber 2017; Tirumala and Tiwari 2022), particularly in areas where the private sector benefits from the ocean (Johansen and Vestvik 2020). Private investors play a critical role driving global environmental change through their significant influence on the world's economy (Galaz et al. 2015). Their involvement in the blue bond market can also help drive ocean governance reforms (Wabnitz and Blasiak 2019) and provide a range of bankable projects for ocean development (Shiiba et al. 2022). Finally, demonstrating the financial materiality of ecological and reputational risks related to the ocean can also help to draw in the private sector (Jouffray et al. 2019).

Furthermore, multiple scholars recognize the importance of multilateral development banks (MDBs) in bridging the funding gap for blue financing. MDBs have strong expertise in managing development projects (Gottschalk and Poon 2020; March et al. 2023) and can leverage private investors (Gottschalk and Poon 2020; Johansen and Vestvik 2020) while balancing social and environmental considerations (Shiiba et al. 2022). However, they are also constrained, given their narrow capital base and risk aversion, to maintain high credit ratings (Gottschalk and Poon 2020).

Sumaila et al. (2021) summarize the range of actors involved in blue financing on a risk–return scale. Some sustainable ocean investments may attract private finance because of their attractive market returns, while others may require a blended finance approach. Finally, some investments may not generate any market return and require investments from public sources.

3.4.4. Blue Bond Yields and Coupon Rates

While there is no analysis yet on the yields or coupon rates in the blue bond market, multiple studies have discussed the "green bond premium", which suggests that green

bonds are slightly more expensive than their traditional equivalents (Thompson 2022). This is because issuers may price green bonds at a premium to fund the additional monitoring and reporting requirements, while investors may be willing to pay a premium for the green bond's reputation and portfolio diversification benefits (Thompson 2022). However, it is unclear whether a similar dynamic will exist in the blue bond market, as the market is not yet well-established (Gonzalez-Ruiz et al. 2019; Roth et al. 2019; Sumaila et al. 2021) and issuers may not be able to command a premium because of limited investor participation. Further research is needed to determine the potential impact of blue bonds on yields and coupon rates.

4. Methodology

4.1. Scope of Research

We created a comprehensive list of blue bonds issued to date. Given the lack of a universal definition of "blue bonds", we included instruments that have been described as "blue". We also included instruments that were essentially blue and linked to the blue bond concept, even if they were not formally marketed as such. We used the definition mentioned earlier in this article and listed instruments that are use of proceeds debt instruments to finance the protection of critical clean water resources and the marine and ocean-based projects that have positive environmental and social benefits.

In essence, we also included "blue" instruments that were originally marketed differently, such as sustainable development bonds that have since been referred to as "blue", given their focus on the marine economy. This approach is in line with Thompson (2022). In addition, we included two corporate green bonds issued by Mowi (2020b) and Grieg Seafood (2021), as they were mentioned in the blue bond guidance issued by the UN Global Compact (2020b). Although marketed in line with the ICMA's Green Bond Principles, their use of proceeds relates to sustainable fisheries.

The UN Global Compact (2020b) acknowledges the presence of additional blue bonds in the market that carry a green label. Moreover, our list does not account for other blue instruments such as blue loans, issued by Banca Transilvania (2022), and blue notes, issued by the Plastic Bank (2022). Thus, this research does not aim to show an exhaustive view of the investments made toward SDG6 and SDG14.

4.2. Research Methodology

To create a comprehensive list of publicly available blue bonds, we gathered information from several sources, including Requicha Ferreira (2022), Thompson (2022), Gonzalez-Ruiz et al. (2019), Mathew and Robertson (2021), Tirumala and Tiwari (2022), and practitioner guides such as the UN Global Compact (2020b). Additionally, we conducted an extensive review of news sources using Google News and Factiva. Our search terms were "blue bond", "blue bonds", "blue bond issue", and "blue bond issuance". We limited the search to news articles between 1 January 2018 and 31 December 2022. Our search on Factiva yielded 912 news articles, which helped us create the complete list of blue bonds included in the Appendix A.

For these blue bonds, we sourced information from a comprehensive array of press releases, prospectuses, investor relations reports, financial reports, newsletters, and webpages. We manually read these sources and extracted and synthesized key information. Where required, we triangulated the information to ensure its accuracy. Information was organized per individual bond along the following dimensions: (1) the issuer of the bond; (2) the amount of the bond, converted into U.S. dollars; (3) the currency in which the bond was issued; (4) the bond's time to redemption; (5) the bond's coupon; (6) the bond's investors and other actors involved such as guarantors; (7) a detailed report on the bond's use of proceeds, for instance through an exhaustive analysis of the issuer's blue bond framework or the bond's second party opinion documents; and (8) the bond's impact metrics, which may be ex ante or ex post. Where no public information was available for a dimension, we indicated it as such and reflected it in our analysis below.

Once this database was compiled, we did statistical and text analyses on its contents. To systematically analyze the blue bonds' use of proceeds, we developed an impact-area taxonomy. We started from the blue economy taxonomy by the World Bank (2017) and collapsed its "ocean service" and "industry" headers into impact areas to ensure consistency in the level of detail reported. To reflect the variety of uses of proceeds beyond a focus on SDG14 and the ocean, we added a "response to water access and scarcity" group of activities. This group reflects additional details related to SDG6 (United Nations n.d.), for instance, related to water access (Target 6.1) and water-use efficiency (Target 6.4). To ensure consistency with preexisting industry frameworks, we defined impact areas within this group based on the water infrastructure criteria developed by the Climate Bonds Initiative (2022b). We added "water storage and distribution infrastructure" and "water use efficiency" as additional topics from the water infrastructure criteria that did not overlap with the blue economy taxonomy. This led to our final impact-area taxonomy. Subsequently, we manually mapped the individual bonds to to its corresponding impact areas based on keyword searches on the use of proceeds information. Details of the results of this analysis can be found in Appendix B.

Within this impact taxonomy, we listed the most frequent impact metrics related to each impact-area. Given the sheer range of impact metrics used in the blue bond market, we did not intend to be exhaustive.

Finally, we did a range of statistical analyses on the quantitative data we collected, such as summing the total market size, averaging the issuance sizes, and reporting on the bonds' durations and coupon rates. We also segment some of these analyses by participant type in the blue bond market.

4.3. Research Contribution

Within this comprehensive overview of blue bonds, we aim to provide an exhaustive view of bonds that have been labeled as or linked to blue bonds up to date. This new database will allow practitioners and researchers in the field to view the growth in size and amount of blue bonds in the first four years of their existence. Our goal is to increase awareness of this innovative financial product and contribute to reaching a consensus over where blue bond proceeds can be invested, as well as how their impact can be measured and monitored.

Through our analysis, we identify key trends and gaps in the current market and provide recommendations for how the blue bond market can be developed further, both in terms of increasing its size and improving its impact on sustainable development. Throughout analysis, we draw comparisons to the more mature green bond market. Our study contributes to the literature on sustainable finance and supports the achievement of SDG14 (Life below water). We hope to help develop a clear framework to support the long-term success and legitimacy of the blue bond market and increase the financing flows toward a sustainable blue economy.

5. The State of Blue Bonds

5.1. Use of Proceeds

5.1.1. Use of Proceeds Data Availability

The availability of public information on the use of proceeds of the blue bonds in our dataset varies drastically (Figure 2). Only one blue bond (Bahamas' Blue Bond) has limited public information on its use of proceeds, as its press release only mentions it will support the "blue economy" (Government of The Bahamas 2022). Eleven bonds provide a detailed list of focus and sub-focus areas for use of proceeds. Most of these bonds are issued in accordance with sustainable debt frameworks released by the issuing organizations themselves, which are based on the definitions and frameworks presented in Section 3.

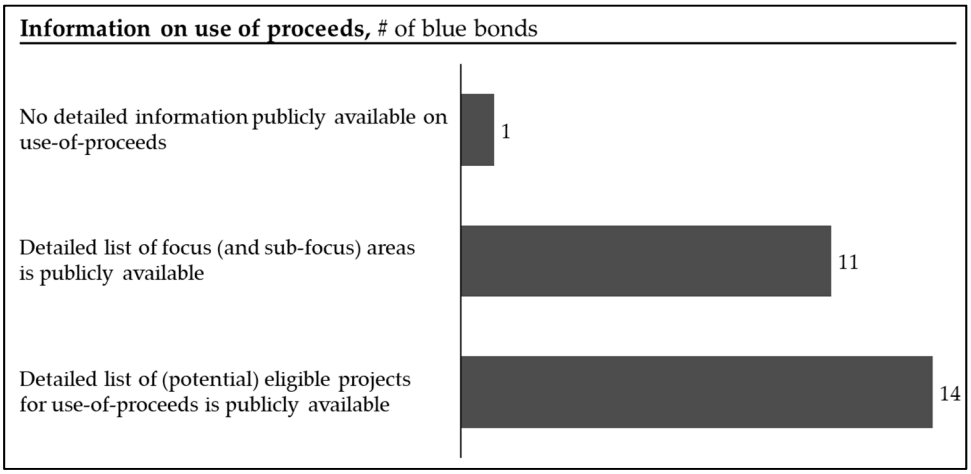

Figure 2. Information on use of proceeds. Source: authors.

Finally, 14 bonds released a detailed list of potentially eligible projects for the use of proceeds. For example, the World Bank (2021c) reports on the project level of its sustainable development bond on its website. Project impact reports contain detailed information on project names, countries, lifetimes, target results, and capital. However, the individual mapping between the sustainability bond issuance and the projects is not publicly available. The NIB (2021) maps its projects to the blue bonds it issued. The NIB's website displays a comprehensive list of financed projects, including customers, countries, loan disbursements, and maturity figures. The website also includes detailed project descriptions, such as how it fulfills the NIB's mandate, and a sustainability summary.

5.1.2. Overview of Use of Proceeds in Blue Bond Database

In our blue bond dataset, 24 out of 26 had sufficient public information on the use of proceeds for mapping purposes. As discussed, the Bahamas' bond did not release detailed information, and the World Bank Sustainability Bond did not provide sufficient detail because of the lack of a linkage between the bond and the individual projects displayed on the World Bank's website. A detailed mapping by bond to the taxonomy can be found in Appendix B, and the results of our mapping are presented in Figure 3.

Most bonds in our dataset invest proceeds to address ocean health challenges, particularly waste and water-waste management. For instance, some bonds support "waste disposal facilities at ports and terminals for the collection" (TMBThanachart 2022c) and "wastewater treatment and water pollution prevention, with the aim of reducing discharges into water (mainly phosphorus, nitrogen, organic matter, heavy metals, plastics and pharmaceuticals)" (NIB 2019b). Other bonds focus on protecting species and habitat protection to preserve the ocean's biodiversity. Such projects include "ecosystem management and natural resources restoration" (Asian Development Bank 2021b), as well as protecting biodiversity within "wetlands, rivers and lakes, coastal areas and open sea zones" (NIB 2019b). Only one bond, Belize's Blue Bond, explicitly mentions the blue carbon industry (Credit Suisse 2021).

Approximately two-thirds of the bonds in our dataset mention sustainable fisheries and aquaculture in their use of proceeds. This is especially true for areas with high dependence on the fisheries industry and at high risk of overfishing, such as the Seychelles, Belize, Thailand, and Hainan Province. Norwegian seafood companies Mowi (2020c) and Grieg Seafood (2020d) intend to invest in "sustainable fish feed [...] with full traceability" and "practices that keep the fish and oceans healthy", respectively. In addition, Maruha Nichiro Corporation (2022a) intends to use the proceeds of their blue bonds for "environmentally sustainable management of living natural sources and land use (environmentally sustainable fishery and aquaculture)".

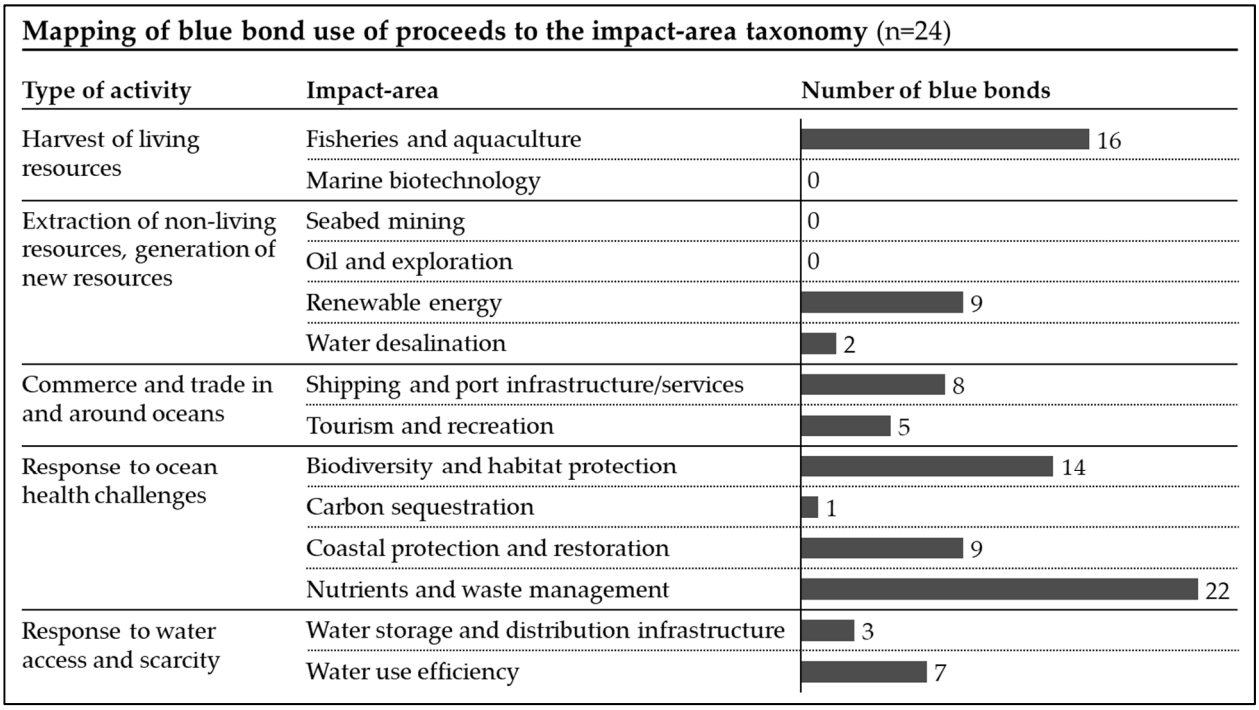

Figure 3. Mapping of blue bond use of proceeds to the impact-area taxonomy. Source: authors, based on taxonomy in World Bank (2017).

Nine bonds in our dataset intend to invest in renewable energy. For instance, the BOC (2020c) allocated 42% of the proceeds of its USD 942.5M bond to offshore wind projects across China. The IDB (2020) also intends to increase the "renewable energy installed capacity" in their blue bond framework. TMBThanachart (2022c) specified that "offshore wind, offshore solar, tidal, wave, or ocean thermal energy [should] not harm marine ecosystems and may include additional measures promoting marine biodiversity". CABEI (2022a) considers a broader scope to be eligible for financing, including "offshore wind and solar farms, tidal and wave energy facilities and other renewable marine energy facilities that utilize ocean thermals, salinity and gradients for power generation and heating and cooling".

Shipping and port infrastructure are mentioned in eight of the blue bonds. This theme is particularly important in the three blue bonds issued by the IDB, which mention the shipping sector, decarbonization of port operations, transportation linking cities, regions and the hinterland, and port facilities (IDB 2021a). Seaspan (2021a), a large shipping management corporation, plans to use the proceeds from its blue bond exclusively for sustainable shipping. The company aims to achieve decarbonization of containerships through the use of low- or zero-carbon fuel sources, as well as retrofits and modifications to improve the operational efficiency of vessels (Seaspan 2021a).

Seven bonds have identified investments aimed at ensuring water access and tackling water scarcity. Mowi (2020c) plans to invest in technology to improve freshwater use in "farming units, feed and processing plants". CABEI (2022a) includes investments in the "design, construction, maintenance and upgrade of land-based infrastructure for drinking water distribution". In addition, BRK Ambiental (2022a) is working on sustainable water management and affordable infrastructure in the Brazilian metropolitan region of Maceió. In terms of water management, they plan to invest in sewage and municipal wastewater treatment systems to reduce water losses from the distribution system. They also aim to invest in infrastructure to improve access to drinking water and sanitation, which will primarily "benefit municipalities with inadequate infrastructure and [...] have the potential to provide additional health benefits to local communities" (BRK Ambiental 2022a).

Finally, five bonds seek funding through blue bonds to invest in the tourism and recreation sector, particularly in regions where a significant portion of GDP relies on the tourism industry, such as in Latin America and the Caribbean, Thailand, and Ecuador. Projects within this category include "education programs for sustainable fisheries" (IDB 2021a) and licensed tourism operators around marine conversation areas (Banco Internacional 2022; TMBThanachart 2022c).

None of the bonds mentioned in this analysis intend to invest in minerals, oil and gas, or pharmaceuticals. Although they are part of the blue economy according to the World Bank's taxonomy, they do not qualify as sustainable blue economy financing by UNEPFI (2021a) and the UN Global Compact (2019). Furthermore, these categories are not expected to be part of the unified blue bond guidance (Mathew and Robertson 2022), which is set to be released later in 2023.

5.1.3. Discussion on Use of Proceeds

While many blue bonds report on their intended use of proceeds in line with a sustainable blue economy, there is no guarantee that the investments will be carried out as planned. This same issue is present in the green bond market, where there is no "enforceable rulebook to ensure that funds are being used as promised" (Verlaine 2021). The potential gap between intention and reality of investments is illustrated the Bank of China's blue bond. Before its issuance in 2020, the BOC (2020c) identified 25 projects worth a total of RMB 7.1 billion, with 58% focused on sustainable water and wastewater management and 42% on offshore wind projects. However, at the end of 2021, Ernst & Young (2022) stated in their independent external review that only 21% of the total funds had been used for sustainable water and wastewater management, while 79% had been allocated to renewable energy. Furthermore, no further information was given on the specific projects that received funding. In contrast, the NIB (2021) links all of its blue bond investments back to individual projects. Like in the green bond market, industry experts believe that the market may self-regulate, with companies that fail to deliver on their promises potentially facing criticism and difficulties raising funding through subsequent blue bond issuances (Verlaine 2021).

However, this lack of a commonly established standard also hinders further growth of the blue bond market (Roth et al. 2019; Sumaila et al. 2021) and may reduce its "thematic legitimacy" (Thompson 2022), despite being in line with a sustainable blue economy. This hinders issuers from labeling their bond as "blue", even though their use of proceeds is fully in line with the sustainable blue economy. This is the case with the green bond issuances by Mowi (2020b) and Grieg Seafood (2021), which relate to sustainable fisheries, but they opted to label their product as a "Green Bond" in line with the ICMA's principles.

The absence of a widely accepted standard also poses challenges for blue bond issuers, who may need to develop additional expertise and may be hesitant to use the blue label. While all bonds discussed in this research invest in the commonly accepted themes of the sustainable blue economy, many issuers developed their own blue finance framework and sought second-party opinions "in absence of blue bond specific guidelines" (Nikkei 2022).

These phenomena are not unexpected for new financial products. The Green Bond Market existed for seven years before the ICMA released its Green Bond Principles in 2014. Once the new blue bond guidance is released later in 2023, it will be easier for organizations to understand and issue blue bonds. Additionally, the risk of "bluewashing" will decrease (Mathew and Robertson 2022).

5.2. Impact-Metric Assessment

5.2.1. Impact-Metric Data Availability

The level of publishing and reporting impact metrics in our blue bonds database varies (Figure 4). Out of 26 bonds in the database, only 17 have reported their impact data, or have outlined an approach and commitment to report data. The remaining 11 bonds do not provide publicly available information on their impact metrics. Of those that do report,

around one-third of the bonds mention overall targets, while the rest track impact targets at the level of the specific projects that are funded by blue bonds.

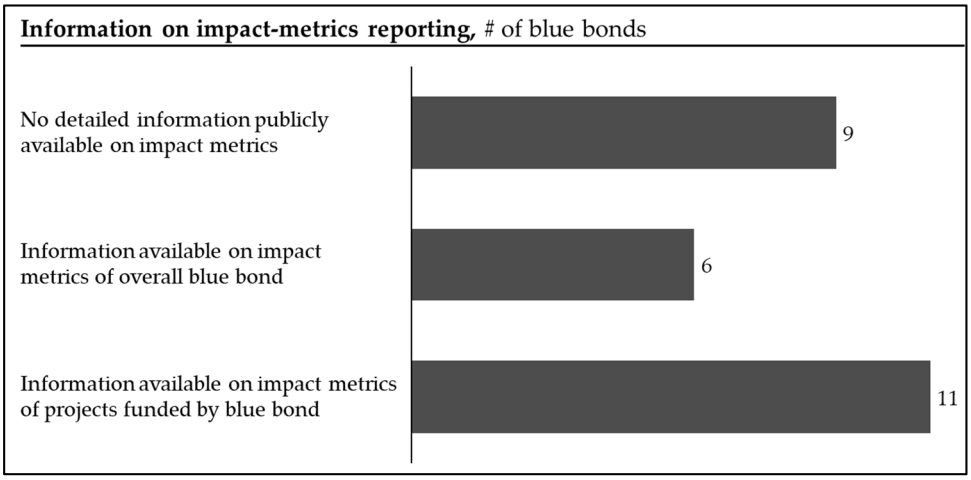

Figure 4. Information on impact-metrics reporting. Source: author.

5.2.2. Overview of Impact Metrics Used in Blue Bond Database

The waste and water management category utilizes various impact metrics. For instance, the NIB (2021) reports that it added or upgraded wastewater treatment plant capacity of almost 1 million population equivalents across its two blue bonds, in addition to reducing nitrogen discharge by 300 t/a. The NIB also tracks other impact metrics, including "avoided overflow of untreated wastewater (m^3/a), BOD discharge (t/a), Phosphorus discharge (t/a), Energy recovery from wastewater sludge (MWh/a) and GHG emissions (t/a)", without impact data up until the end of 2021. The BOC (2020c) aims to achieve an "incremental sewage treatment capacity of 6,176,161 m^3/day". Other metrics in this category include "annual catchment of water (m^3/year)", "annual avoided/reduced of chemical/plastics/harmful substances (tons/year)", and achieving a "marine water quality index (MWQI) in line with local/global standards" (TMBThanachart 2022c).

A common impact target set within biodiversity is to increase the sustainable-use marine protected areas (MPAs) to 30% (World Bank 2018a). This target was set in the Seychelles, Belize, and Barbados. It is a common target negotiated in the debt-for-nature swaps with the Nature Conservancy, which helps reduce the debt burden on small-island developing states in exchange for setting ambitious ocean conservation targets.

In sustainable fisheries, TMBThanachart (2022c) mentions international standards such as the Marine Stewardship Council (MSC) certification and the Aquaculture Stewardship Council. Furthermore, the Government of the Republic of Fiji (2022) plans to benchmark the projects funded through the blue bond it intends to issue in 2023 to the MSC.

Most offshore wind projects use "MW installed capacity" as an impact target. For instance, the BOC (2020c) committed to installing 2987 MW in capacity for offshore wind power projects.

Within sustainable shipping, Seaspan (2021a) aims to adhere to the Poseidon Principles, which are aligned with the International Marine Organization's target of reducing greenhouse gas emissions by 50% by 2050 compared to 2008.

Water access impact targets vary in scope. BTK reports on the "average percentage of the population of the municipalities served with sanitation services" and the "efficiency of sewage treatment" (Sustainalytics 2022b). Furthermore, CABEI reports on the "number of new connections to drinking water system" (Sustainalytics 2022a). In addition, water-use efficiency is typically measured as water savings in million m^3/year (Mowi 2022) or as a percentage in comparison to "traditional non-recirculating aquaculture systems" where 100% would equate to fully circulating systems (Grieg Seafood 2022).

Finally, investments in sustainable tourism by TMBThanachart (2022c) seek to be in line with Global Sustainable Tourism Council or an equivalent certification.

5.2.3. Discussion

Bonds that have clear impact targets are more "likely to attract greater interest from investors" (Mathew and Robertson 2021) and can enable financing toward sustainable ocean development (Sumaila et al. 2021). Additionally, robust impact metrics help evaluate whether blue bonds are achieving sustainable impact (Thompson 2022) and allow for comparisons between different bonds (Roth et al. 2019).

In line with Thompson (2022), it is arguable that the impact metrics used by blue bond issuers lack detail and robustness. First, it is concerning that only two-thirds of the bonds provide information on targets. Even if investors know the areas for the use of proceeds of the blue bonds, it would be beneficial to understand the aspirational impact that the funding would bring over the lifespan of the bond. Second, even when targets are set, investors should interpret their meaning with caution in relationship to the SDGs, the context of the company, and overall sustainability goals. For instance, Seaspan (2021b) set a GHG reduction target of 50% by 2050, in line with the International Marine Organization's goals, and highlights its "efforts to improve the environmental performance of its fleet and contribute to the path towards decarbonization of its industry". However, in their second-party opinion, Sustainalytics (2021) notes that this target does not align with a two-degree climate scenario, i.e., net zero by 2050. Finally, adequate and structured reporting on progress of blue bond investments versus the initial targets is even less prevalent across the dataset. However, it must be recognized that many bonds were only issued in 2022, which could prevent them from reporting on impact for now. The NIB (2021) is the exception to this statement. They offer transparent reporting across all projects supported by blue bond investments, including its impact across a range of targets.

We also note a significant lack of standardization of the impact metrics used by blue bond issuers, as previously highlighted by Roth et al. (2019). While some areas, such as wastewater management and renewable energy, have established metrics, others rely on a range of metrics or industry standards as benchmarks. Moreover, the use of carbon sequestration as a proxy metric has not been widely adopted, despite earlier proposals by Roth et al. (2019).

To develop the blue bond market into a mature market, a greater level of detail, rigor, and standardization is needed in the development of impact metrics. Additional guidance and industry-wide standard-setting may be required to achieve the desired level of transparency and accountability.

5.3. Overview of the Blue Bond Market between 2018–2022

5.3.1. Total Size of the Market

Between 2018 and 2022, 26 blue bonds were issued (Figure 5). The first blue bond was issued in the Seychelles in 2018, which is considered as the first landmark issuance. In 2022, 11 bonds were issued, indicating significant growth in the blue bond market. The total value of bonds issued between 2018 and 2022 is approximately USD 5.0B. This represents a compound annual growth rate (CAGR) of 92% per annum over the four-year period. In 2020, blue bond issuances equaled 0.47% of the value of green bond issuances. The largest total value of issued blue bonds within a single year was in 2021 at USD 1.5B.

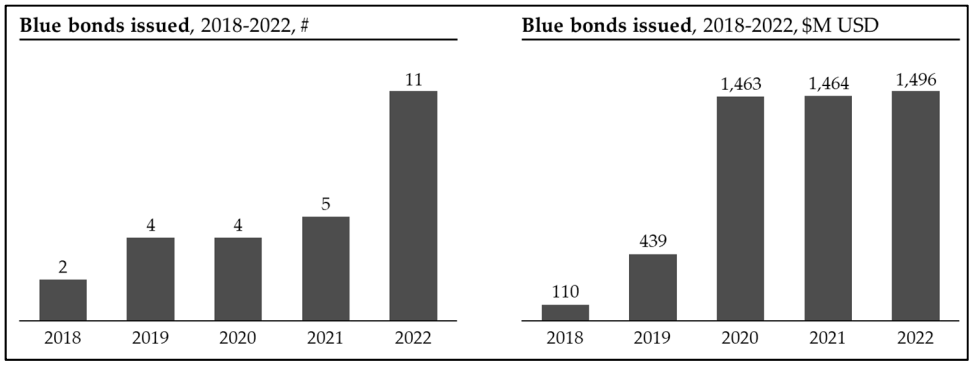

Figure 5. Blue bonds issued, 2018–2022. Source: authors.

The blue bond market Is expected to continue its growth trend in 2023. In January, the Korea Eximbank issued a USD 1B blue bond to support sustainable shipbuilding and renewable energy (Young-sil 2023), while Desarrollos Hidráulicos de Cancun issued Mexico's first blue bond worth MXN 1.4 billion (USD 74M) to improve drinking water supply to surrounding communities (BBVA 2023). The Central American Bank for Economic Integration, CABEI (2023), also issued its second blue bond in the Japanese market worth JPY 7 billion (USD 53M) to support its blue taxonomy objectives. Furthermore, Banco Internacional in Ecuador and the governments of Fiji and Indonesia have announced their intentions to issue blue bonds in 2023 (Banco Internacional 2022; Government of the Republic of Fiji 2022; UNDP 2022). These developments indicate that the blue bond market will surpass the values recorded between 2020 and 2022.

5.3.2. Average Size of Blue Bonds

The 26 blue bonds issued over the last five years have varied significantly in size (Figure 6). The smallest two bonds issued were valued at USD 10M and were issued by the World Bank (World Bank 2019c, 2021a). The median value of blue bonds issued was USD 123M, while the average value was USD 193M. The largest bond issued so far was the Bank of China's USD 942.5M bond, which was issued as a dual-currency transaction. The CNH tranche worth CNH 3 billion (USD 442.5M) was issued by the Bank of China's Macau branch, while the USD tranche worth USD 500 million was issued by the Paris branch.

Blue bond summary statistics (M USD)				
Minimum	First quartile	Median	Third quartile	Maximum
$10	$36	$123	$220	$943

Figure 6. Blue bond summary statistics (M USD). Source: authors.

Compared to the green bond market, where the median size of a deal exceeded USD 500M in 2021 (Climate Bonds Initiative 2022a), the size of deals in the blue bond market is comparatively small. This highlights the relative immaturity of the blue bond market compared to the green bond market, which was established in 2007. As previously mentioned, private-sector investors typically require a substantive market size before they will get involved (Roth et al. 2019; Sumaila et al. 2021). This report on the growing size of the blue bond market may gradually convince more private actors to participate in the market, further contributing to its growth.

5.3.3. Currency of Blue Bond Issuances

Most blue bonds have been issued in U.S. dollars, regardless of whether issuing entity was based in the United States or not (Figure 7). This aligns with the general trend in international debt capital markets where the U.S. dollar is the dominant currency used in debt instruments deals (Dealogic, and ICMA 2022). The Inter-American Development

Bank issued three blue bonds in Australian dollars, which allowed them to attract local Australian investors and Japanese institutional investors (IDB 2021b, 2022d). The Nordic Investment Bank, an international financial institution with members states in northern Europe and the Baltic States (NIB n.d.), issued two out of the three bonds in Swedish krona (NIB 2019c, 2020). Additionally, Mowi (2020b), a Norwegian seafood company, and the World Bank (2019b) issued blue bonds denominated in euros. However, the euro is underrepresented in the blue bond market compared to the green bond market, where three-quarters of the bonds are issued in euros or U.S. dollars (Caramichael and Rapp 2022). Further research should examine how the euro-denominated blue bond market can be further developed.

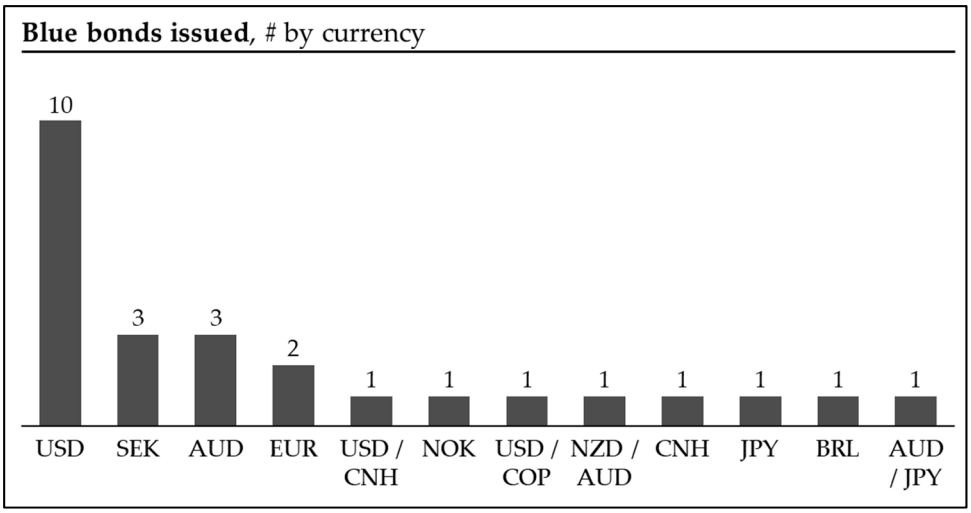

Figure 7. Blue bond issued by currency, 2018–2022. Source: authors.

Some blue bonds were also issued in other currencies, such as the Chinese yuan by the People's Government of Hainan Province on the Hong Kong stock market (HKSAR Government 2022), the Japanese yen by seafood company Maruha Nichiro Corporation (2022c), the Norwegian krone by Grieg Seafood (2020b), and the Brazilian real by water infrastructure company BRK Ambiental (2022a). Finally, four bonds had mixed currencies. The Bank of China issued a dual-tranche bond in U.S. dollars and Chinese yuan (BOC 2020c). The Asian Development Bank (2021a) launched its "Blue Bond for Ocean Investments" in Australian and New Zealand dollars, attracting Japanese institutional investors for each. The World Bank (2021b) issued a blue bond in Colombian pesos, payable in U.S. dollars, and the Central American Bank for Economic Integration, CABEI (2022b), attracted Australian and Japanese investors with its dual-tranche bond issued in December 2022.

5.3.4. Maturity of Blue Bonds

The median maturity of the blue bonds in the dataset is 7.0 years, while the average maturity is 8.9 years (Figure 8). The Bank of China's CNH-denominated tranche has the shortest maturity of 2 years (BOC 2020c), while Belize's Blue Bond has the longest maturity of 20 years (TNC 2021b). It is worth noting that the average maturity of blue bonds is comparable to that of green bonds, which have an average maturity between 7 and 9 years (Ehlers and Packer 2017; Flammer 2021). However, it is important to consider the maturity of blue bonds in context of their projected impact. Blue bond issuers should be aware of the "time lags between project implementation and the delivery of positive and/or negative impacts" (Thompson 2022).

Blue bond summary statistics (maturity, number of years)				
Minimum	First quartile	Median	Third quartile	Maximum
2.0	5.0	7.0	14.0	20.0

Figure 8. Blue bond summary statistics (maturity, number of years). Source: authors.

5.3.5. Coupon Interest Rates of Blue Bonds

Twenty out of 26 blue bonds in our dataset disclosed information about the coupon rate (Figure 9). Among them, 15 bonds had fixed coupon rates, while the rest had variable coupon arrangements. For instance, some variable coupon rates were linked to the 6-month Secured Overnight Financing Rate (TMBThanachart 2022b), the constant maturity swap rate (World Bank 2019b), the Norwegian or London Interbank Offered Rate (Grieg Seafood 2020a; Mowi 2020a), or the *Título Público Tesouro IPCA+* (BRK Ambiental 2022a). Out of the 15 fixed coupon rates, the median and average coupon rates were both 3.15%. Most bonds were priced at par, although some bonds, such as BOC (2020c)'s USD-denominated trench, were issued at a discount.

Blue bond summary statistics (coupon-%)				
Minimum	First quartile	Median	Third quartile	Maximum
0.10%	0.79%	3.15%	4.65%	9.00%

Figure 9. Blue bond summary statistics (coupon-%). Source: authors.

As the blue bond market matures and a robust blue bond database is established, it would be interesting to investigate whether a "blue bond premium" exists. For instance, for green corporate bonds, Caramichael and Rapp (2022) found that green bonds have a "yield spread that is 8 basis points lower relative to conventional bonds", which they linked to bond oversubscription. Some blue bonds in our dataset mention they were oversubscribed, which suggests the need to explore whether this could have resulted in a blue bond premium.

5.4. Blue Bond Market Actors

More than half of the blue bonds in our database are associated with international financial institutions (Figure 10). These include blue bonds that were directly issued by these institutions, such as those by the World Bank and the Asian Development Bank. Additionally, some of the bonds issued by governments were supported by an international financial institution, as in the case of the Seychelles' bond. Furthermore, three bonds were issued by domestic banks with support from the International Finance Corporation (IFC).

On the other hand, five blue bonds in our dataset were issued by corporations, namely Seaspan Corporation, Maruha Nichiro, Mowi, Grieg Seafood, and BRK Ambiental. The rest of the bonds were issued by an environmental organization, the Nature Conservancy, a state-owned bank, the Bank of China, and a government, Hainan Province, China.

This distribution of actors reflects the fact that blue bonds are still in their early stage. In 2021, over half of the value of green debt issuances came from financial and non-financial corporations (Climate Bonds Initiative 2022a). However, less than one-fifth of the blue bonds in our dataset were issued by corporations. Even when corporations such as Mowi and Grieg Seafood clearly linked their bonds to the water and ocean sector, they still branded them as "green". This could be because the green bond market is more established, and an alignment with the ICMA green bond framework inspires more trust among investors, given that financial markets "are structured along [...] accepted instruments" (Roth et al. 2019). Additionally, corporations usually issue larger bonds, which has contributed to the growth of the green bond market. This difference in average size is also evident in the blue bond market: on average, corporations issued bonds that

were 2.6 times larger than those issued by international financial institutions (USD 307M vs. USD 117M).

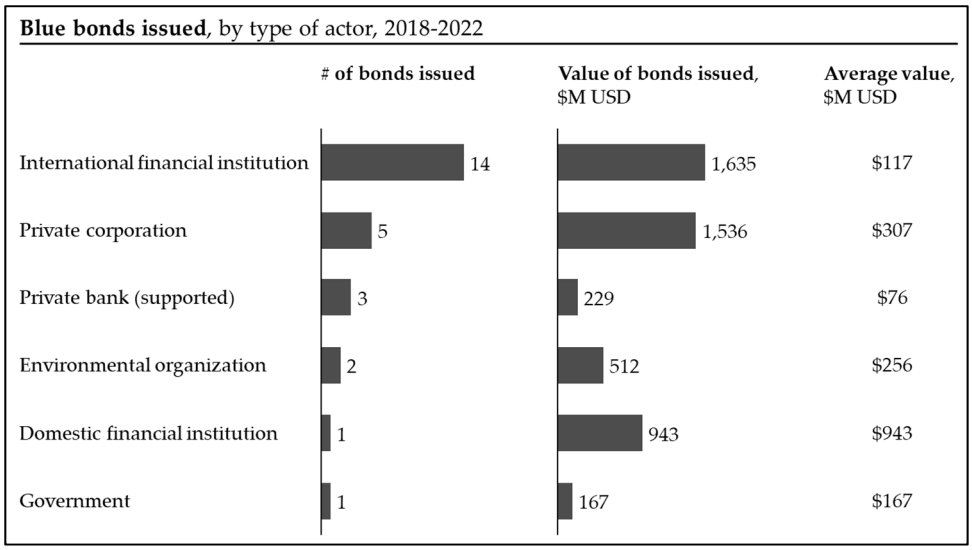

Figure 10. Blue bonds issued, by type of actor, 2018–2022. Source: authors.

That said, international financial institutions can provide "cornerstone issuances" with the initial "size and scale that large investors need", similar to what happened in the early stages of the green bond market, as mentioned by Suzanne Johnson from UN Global Compact's Sustainable Ocean Business platform (Gambetta 2021). A similar trend is happening in the early stages of the blue bond market, with the top five issuers setting up programs that can help the ocean financing market take off further (Figure 11).

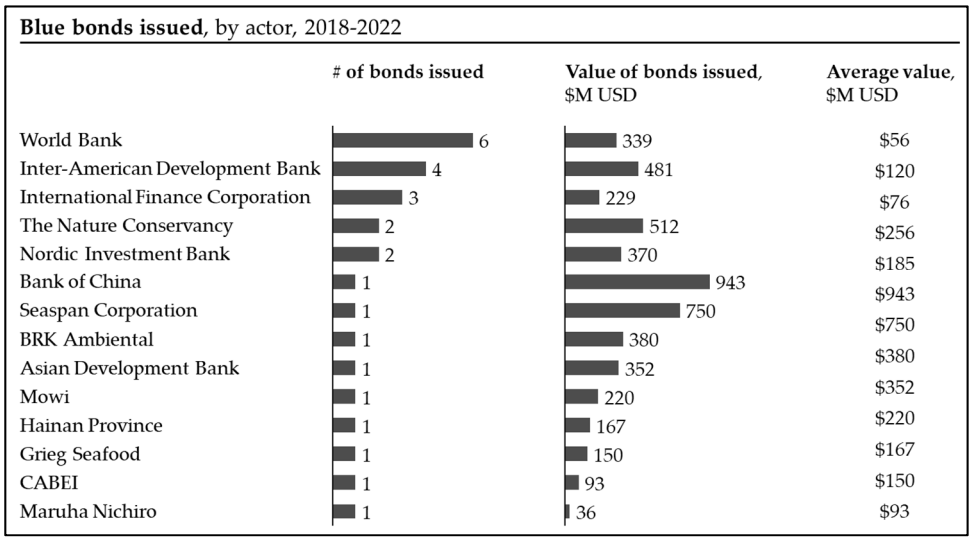

Figure 11. Blue bonds issued, by actor, 2018–2022. Source: authors.

- The World Bank has issued five blue bonds for a total of USD 324M, in line with its PROBLUE program established in 2018 to support the implementation of SDG14 and the "sustainable and integrated development of oceanic sectors in healthy oceans" (World Bank 2022b). The World Bank also supported the Seychelles with a partial guarantee in its USD 15M blue bond (World Bank 2018a).
- The Inter-American Development Bank has issued three blue bonds worth USD 96M under its Sustainable Debt Framework (IDB 2020), and provided a USD 200M policy-based guarantee in the Government of The Bahamas (2022)'s USD 385M blue bond.

- The International Finance Corporation released its "Guidelines for Blue Finance" in 2022 (IFC 2022c) and supported three financial corporations to issue blue bonds and develop their own blue bond framework. Banks were supported in Thailand, the Philippines, and Ecuador for issuances of USD 50M, USD 100M, and USD 79M, respectively.
- The Nature Conservancy launched its "Blue Bonds for Conservation" project in 2019 and committed USD 40.5M to refinance USD 1.6B in debt (TNC 2021b, 2022). Under this program, it has supported Belize and Barbados in so-called "debt-for-nature swaps" to free up financing for ocean investments.
- The Nordic Investment Bank has issued two blue bonds worth USD 370M with a focus "only on investments within water management and protection category". The bonds aim to attract "investors that are conscious of the challenges facing the region's water resources, especially those affecting the Baltic Sea", such as eutrophication and water infrastructure depletion (NIB 2019a, n.d.).

6. Conclusions

The blue bond market is still in its early stages, and various challenges must be overcome for it to grow to its full potential. Lack of standardized definitions and lack of expertise by issuers and investors are significant barriers to the blue bond market. This research contributes to developing a comprehensive review of the current state and existing practices in the blue bond market and supports its long-term success and legitimacy. Blue bonds are a crucial tool to attract investments into ocean financing (Roth et al. 2019) and can help close the funding gap for a sustainable blue economy (Tirumala and Tiwari 2022). Our research has established a list of 26 blue bonds issued between 2018 and 2022, indicating that the market has grown significantly. However, the blue bond market is still small compared to the green bond market, with most bonds issued by international finance institutions. Market participation by corporations and banks will be crucial for the further expansion of the blue bond market (Jouffray et al. 2021; Shiiba et al. 2022; Thiele and Gerber 2017; Tirumala and Tiwari 2022), but important challenges remain. While all bonds' uses of proceeds are in line with a sustainable blue economy, a global standard of what blue bonds entail is lacking. This lack of standard has prevented corporations from labeling bonds as "blue" (Shiiba et al. 2022), given the green label was more established. Standardization will also prevent "bluewashing" (Mathew and Robertson 2021; Thompson 2022) and ensure the "thematic legitimacy" of the blue bond market (Thompson 2022).

The use of impact metrics in the blue bond market is insufficient compared to best practice. Only two-thirds of blue bond issuers release impact metrics, which prevents investor trust and confidence (Mathew and Robertson 2021, 2022). Furthermore, given the lack of common standards (Roth et al. 2019), some impact metrics are not in line with well-established norms such as the two-degree climate scenario, which raises a discussion over whether we can label these bonds as "sustainable". Finally, reporting on progress versus the set targets is underdeveloped in the blue bond market (Thompson 2022). Significant progress needs to be made across these three areas to support investor interest and encourage more corporations and banks to enter the blue bond market.

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Appendix A. List of Blue Bonds Issuances

#	Release	Issuer	Amount (USD M)	Currency	Redemption	Sources
1	Aug 18	World Bank (IBRD)	95	SEK	7 years	(Rosane 2018; World Bank 2018d, 2018e)
2	Oct 18	Government of Seychelles	15	USD	10 years	(World Bank 2018a, 2018b, 2018c)
3	Jan 19	Nordic Investment Bank	220	SEK	5 years	(NIB 2019b, 2019c, 2021; NIB, and SEB 2019)
4	Apr 19	World Bank (IBRD)	10	USD	3 years	(Morgan Stanley 2019; World Bank 2019c)
5	May 19	World Bank (IBRD)	180	EUR	20 years	(Rosane 2018; World Bank 2018d, 2019b)
6	Nov 19	World Bank (IBRD)	29	USD	5 years	(World Bank 2019a)
7	Jan 20	Mowi ASA	220	EUR	5 years	(Mowi 2020a, 2020b, 2020c, 2022)
8	Oct 20	Nordic Investment Bank	150	SEK	5 years	(NIB 2020; NIB et al. 2020)
9	Nov 20	Grieg Seafood–Jun 2020 Grieg Seafood–Nov 2020	100 50	USD	5 years 5 years	(CICERO 2020; Grieg Seafood 2020a, 2020b, 2020c, 2020d, 2022)
10	Nov 20	Bank of China–CNH tranche Bank of China–USD tranche	443 500	CNH, USD	2 years 3 years	(BOC 2020a, 2020b, 2020c; Davis 2020; Ernst & Young 2020, 2022)
11	May 21	World Bank (IBRD)	10	USD, COP	5 years	(World Bank 2021a, 2021b, 2021c, 2021d)
12	Jul 21	Seaspan Corp	750	USD	8 years	(Seaspan 2021a, 2021b; Sustainalytics 2021)
13	Sep 21	Asian Development Bank–AUD Asian Development Bank–NZD	151 151	AUD, NZD	15 years 10 years	(Asian Development Bank 2021a, 2021b, 2022a)

#	Release	Issuer	Amount (USD M)	Currency	Redemption	Sources
14	Nov 21	IDB Invest	37	AUD	10 years	(IDB 2020, 2021a, 2021b)
15	Nov 21	Government of Belize	365	USD	20 years	(Credit Suisse 2021; TNC 2021a, 2021b)
16	May 22	TMBThanachart Bank	50	USD	5 years	(IFC 2022e; TMBThanachart 2022a, 2022b, 2022c)
17	Jun 22	The Commonwealth of the Bahamas	385	USD	7–14 years	(Government of The Bahamas 2022; IDB 2022a; West 2022)
18	Jun 22	BDO Unibank Philippines	100	USD	7 years	(BDO 2022a, 2022b; IFC 2022b)
19	Oct 22	Government of Barbardos	147	USD	15 years	(Government of Barbados 2022a, 2022b; TNC 2022)
20	Oct 22	IDB Invest	25	AUD	15 years	(IDB 2020, 2022d)
21	Nov 22	People's Government of Hainan Province	167	CNH	2 years	(Credit Agricole 2022; HKSAR Government 2022; Linklaters 2022)
22	Nov 22	Maruha Nichiro Corporation	36	JPY	5 years	(Maruha Nichiro Corporation 2022a, 2022b, 2022c)
23	Nov 22	IDB Invest	34	AUD	20 years	(IDB 2020, 2022c)
24	Nov 22	Banco Internacional	79	USD	4 years	(Banco Internacional 2022; IFC 2022a, 2022d)
25	Nov 22	BRK Ambiental	380	BRL	20 years	(BRK Ambiental 2022a, 2022b; Environmental Finance 2022; Sustainalytics 2022b)
26	Dec 22	CABEI–AUD CABEI–JPY	21 72	AUD, JPY	5 years 5 years	(CABEI 2022a, 2022b; Sustainalytics 2022a)

Appendix B. Mapping of the Blue Bonds

		2018				2019				2020				2021							2022						
Type of Activity	**Impact Area**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**
Harvest of living resources	Fisheries and aquaculture	X	X			X	X	X		X				X	X	X	X				X	X	X	X	X		X
	Marine biotechnology																										
Extraction of non-living resources, generation of new resources	Seabed mining																										
	Oil and exploration																										
	Renewable energy									X	X			X	X		X				X			X	X		X
	Water desalination										X																X
Commerce and trade in and around oceans	Shipping and port infrastructure/services												X	X	X		X				X	X		X			X
	Tourism and recreation														X		X				X			X	X		
Response to ocean health challenges	Biodiversity and habitat protection	X	X	X		X	X		X					X		X	X		X	X		X	X				X
	Carbon sequestration															X											
	Coastal protection and restoration	X		X		X	X		X		X						X					X					X
	Nutrients and waste management	X		X	X	X	X	X	X	X	X			X	X	X	X		X	X	X	X	X	X	X	X	X
Response to water access and scarcity	Water storage and distribution infrastructure										X															X	X
	Water use efficiency	X		X		X		X	X	X																	X

Appendix C. Details per Blue Bond

AUGUST 2018: WORLD BANK SUSTAINABLE DEVELOPMENT BOND	
Issuer	World Bank
Amount ($)	95M USD
Currency	SEK (1 billion)
Redemption	7 years
Coupon	0.625% (issue price 99.172%)
Investors	AP1, SEB Företagsobligationsfond, SPP Storebrand, Swedbank Robur Fonder AB
Concessionary financing	Unspecified
Other actors	SEB (Lead manager)
Use-of-proceeds	"- Sustainable use of water in order to increase access to safe and reliable water sources - Sustainable use of ocean resources and marine life" The sustainable development bond is part of an initiative to highlight the critical role of water and ocean resources and mentions a focus on "conservation and sustainable use of fresh and salt water resources", "sustainable water management to ensure access to safe water and water security" and "sustainable use of ocean and marine resources", "strong governance of marine and coastal resources to support sustainable fisheries and aquaculture", more resilient coastlines, "[. . .] coastal and marine protected areas, and reduce[d] pollution"
Geography	Unspecified
Impact metrics	Unspecified
Notes	
Sources	(Rosane 2018; World Bank 2018d, 2018e)

OCTOBER 2018: SEYCHELLES BLUE BOND	
Issuer	Government of Seychelles
Amount ($)	15M USD
Currency	US dollar
Redemption	10 years
Coupon	6.50%
Investors	Prudential, Calvert Impact Capital, Nuveen
Concessionary financing	The World Bank (partial guarantor), Global Environment Facility (concessional loan)
Other actors	BNY Mellon (trustee), Standard Chartered Bank (placement agent), Rockefeller Foundation (donor), Seychelles Conservation and Climate Adaptation Trust (grant manager), Development Bank of Seychelles (loan fund manager)
Use-of-proceeds	"Expansion of sustainable-use marine protected areas, improved governance of priority fisheries, project management and coordination, promotion of sustainable practices, fisheries management planning, education awareness programs, stock rebuilding, refitting fishing vessels, aquaculture development"
Geography	Seychelles
Impact metrics	Increase the sustainable-use marine protected areas to 30% by 2020
Notes	The Rockefeller Foundation granted 425,000 USD to assist with the transaction costs for the Bond (e.g., the legal fees). Projects are funded through the Blue Grant Fund, which provides grants (up to 70K USD) to fund early-stage innovations to de-risk business ideas as well as the Blue Investment Fund, which provides loans of 50K to 3M USD to projects at an interest rate of 4%.
Sources	(World Bank 2018a, 2018b, 2018c)

JANUARY 2019: NORDIC-BALTIC BLUE BOND	
Issuer	Nordic Investment Bank (NIB)
Amount ($)	220M USD
Currency	SEK (2 billion)
Redemption	5 years
Coupon	0.375%
Investors	89% investors are based in Sweden, 11% elsewhere. 48% of investors are pension funds or institutional investors, 40% asset managers or funds, 12% banks, and <1% are retail or private investors. Investors included AMF, AP3, Captor, Cliens Kapitalförvaltning, Handelsbanken, LF Jönköping, LF Treasury, SEB Investment Management, WWF, Öhman Fonder, Swedbank Robur.
Concessionary financing	None mentioned
Other actors	SEB (lead manager)
Use-of-proceeds	"- **Wastewater treatment and water pollution prevention**: with the aim of reducing discharges into water (mainly phosphorus, nitrogen, organic matter, heavy metals, plastics and pharmaceuticals) - **Stormwater systems and flood protection**: with the aim of supporting pollution prevention and the development of climate change resilient infrastructure - **Protection of water resources**: with the aim of minimising groundwater extraction and contamination, and improving the replenishment of aquifers - **Protection and restoration of water and marine ecosystems**: projects aimed at the extension of protected areas, protection and restoration of water and marine ecosystems, and biodiversity (such as wetlands, rivers and lakes, coastal areas and open sea zones)" In line with NIB's Environmental Bond Framework in the category "Water management and protection"
Geography	Denmark, Estonia, Finland, Iceland, Latvia, Lithuania, Norway, Sweden
Impact metrics	Added/upgraded WWTP capacity/connections (997,170 PE up until 12/31/2021 across two NIB blue bonds) Nitrogen discharge (−300 t/a up until 12/31/2021 across two NIB blue bonds) NIB also mentions avoided overflow of untreated wastewater (m^3/a), BOD discharge (t/a), Phosphorus discharge (t/a), Energy recovery from wastewater sludge (MWh/a) and GHG emissions (t/a), without impact up until 12/31/2021.
Notes	NIB details the financing on a project-by-project basis, linked to their Blue Bond projects. This includes details on the loans granted and their respective impact.
Sources	(NIB 2019b, 2019c, 2021; NIB, and SEB 2019)

APRIL 2019: WORLD BANK & MORGAN STANLEY SUSTAINABILITY BOND	
Issuer	World Bank
Amount ($)	10M USD
Currency	U.S. dollar
Redemption	3 years
Coupon	2.35% (Year 1), 2.70% (Year 2), 3.15% (Year 3)
Investors	Unspecified
Concessionary financing	n/a
Other actors	Morgan Stanley (lead manager)
Use-of-proceeds	"Plastic waste reduction efforts in oceans Promotion of the sustainable use of marine resources in developing countries including scientific research, policy and regulatory reform and cross-sector collaboration." The bond is issued in line with the World Bank's Sustainable Development Bond Framework which mentions the "twin goals of eliminating extreme poverty and promoting shared prosperity".

Geography	Developing countries, unspecified
Impact metrics	Project-level reporting can be found on the World Bank's website. Project impact reports include detailed information on project name, country, lifetime, target results, and capital. The individual mapping between the sustainability bond issuance and the projects is not publicly available.
Notes	Even though originally described as a "sustainability bond", this transaction has been frequently referred to as a "blue bond" after given its focus on ocean plastic waste.
Sources	(Morgan Stanley 2019; World Bank 2019c)

MAY 2019: WORLD BANK SUSTAINABLE DEVELOPMENT BOND	
Issuer	World Bank (International Bank for Reconstruction and Development, IBRD)
Amount ($)	180M USD
Currency	EUR (200 million)
Redemption	20 years
Coupon	CMS10y10y—1.274%
Concessionary financing	n/a
Other actors	HSBC (lead manager)
Use-of-proceeds	Raise awareness for the critical role that water and ocean resources play in development around the world "- Sustainable use of water in order to increase access to safe and reliable water sources - Sustainable use of ocean resources and marine life" The sustainable development bond is part of an initiative to highlight the critical role of water and ocean resources and mentions a focus on "conservation and sustainable use of fresh and salt water resources", "sustainable water management to ensure access to safe water and water security" and "sustainable use of ocean and marine resources", "strong governance of marine and coastal resources to support sustainable fisheries and aquaculture", more resilient coastlines, "[. . .] coastal and marine protected areas, and reduce[d] pollution"
Geography	Global
Impact metrics	Unspecified
Sources	(Rosane 2018; World Bank 2018d, 2019b)

NOVEMBER 2019: WORLD BANK & CREDIT SUISSE SUSTAINABLE DEVELOPMENT BOND	
Issuer	World Bank
Amount ($)	28.6M USD
Currency	U.S. dollar
Redemption	5 years
Coupon	Unspecified
Investors	Credit Suisse private wealth management clients (through Credit Suisse's Low Carbon Blue Economy Note)
Concessionary financing	n/a
Other actors	Credit Suisse (sole manager)

Use-of-proceeds	"Raise awareness for the vital role fresh and saltwater resources play for people, livelihoods, and the planet Promote strong governance of marine and coastal resources to support sustainable fisheries and aquaculture Make coastlines more resilient Establish coastal and marine protected areas Improve solid waste management to reduce pollution in waterways and oceans Sustainable fisheries Ocean waste upcycling" The bond is issued in line with the World Bank's Sustainable Development Bond Framework which mentions the "twin goals of eliminating extreme poverty and promoting shared prosperity".
Geography	Unspecified
Impact metrics	Project-level reporting can be found on the World Bank's website. Project impact reports include detailed information on project name, country, lifetime, target results, and capital. The individual mapping between the sustainability bond issuance and the projects is not publicly available.
Notes	Even though originally described as a "sustainability bond", this transaction has been frequently referred to as a "blue bond".
Sources	(World Bank 2019a)

JANUARY 2020: MOWI GREEN BOND	
Issuer	Mowi ASA FRN
Amount ($)	$220M USD
Currency	Euro (200 million)
Redemption	5 years
Coupon	EURIBOR + 1.60%
Investors	Unspecified
Concessionary financing	n/a
Other actors	Danske Bank (global coordinator), DNB markets (green bond advisor), Nordea (joint lead manager), ABN Amro (joint lead manager), Rabobank (joint lead manager), SEB (joint lead manager), CICERO (SPO)
Use-of-proceeds	- "Environmentally sustainable aquaculture: sustainable feed sustainable fish farms, sustainable processing, research and development, environmental management & fish welfare - Energy efficiency - Water & wastewater management [e.g., improving water quality, improve freshwater use efficiency] - Waste management - Eco-efficient and/or circular economy adapted products, production technologies & processes"
Geography	Scotland, Norway, Chile, Canada, Faroes
Impact metrics	Mowi mentions many KPIs in its Green Bond Framework, including related to the SDG targets: - "SDG14: 14-1 (reduce marine pollution), 14-4 (sustainable fishing) - SDG7: 7-3 (double the improvement in energy efficiency) - SDG6: 6-3 (improve water quality, wastewater treatment and safe reuse), 6-4 (increase water-use efficiency and ensure freshwater supplies) - SDG12: 12-2 (sustainable management and use of natural resources), 12-4 (responsible management of chemicals and waste), 12-5 (substantially reduce waste generation)" For each of the focus areas, it details further KPIs such as "annual energy reduced/avoided (MWh), reduced fish escapes (%)", etc.
Sources	(Mowi 2020a, 2020b, 2020c, 2022)

OCTOBER 2020: NIB BALTIC SEA BLUE BOND	
Issuer	Nordic Investment Bank (NIB)
Amount ($)	150M USD
Currency	SEK (1.5 billion)
Redemption	5 years
Coupon	0.10%
Investors	Investors were 95% Swedish, 4% Finnish, 1% other European. 69% were fund managers, 30% pension and insurance funds, and 1% retail. Investors included "Folksam Group, Svenska Handelsbanken Asset Management, Nordea Asset Management, Robur Asset Management, Skandia Liv, Storebrand Asset Management"
Concessionary financing	Unspecified
Other actors	Danske Bank, Swedbank (joint lead managers)
Use-of-proceeds	See above (January 2019 Nordic-Baltic Blue Bond)
Geography	Denmark, Estonia, Finland, Iceland, Latvia, Lithuania, Norway, Sweden
Impact metrics	See above (January 2019 Nordic-Baltic Blue Bond)
Notes	See above (January 2019 Nordic-Baltic Blue Bond)
Sources	(NIB 2020; NIB et al. 2020)

NOVEMBER 2020: GRIEG SEAFOOD GREEN BOND	
Issuer	Grieg Seafood
Amount ($)	150M USD (tranche 1 of 100M USD in June 2020; tranche 2 of 50M USD in November 2020)
Currency	NOK
Redemption	5 years
Coupon	3 m NIBOR + 340 bps
Investors	Unspecified
Concessionary financing	Unspecified
Other actors	DNB markets and Nordea (joint lead managers and green bond advisors)
Use-of-proceeds	"Post-smolt production and investments in Newfoundland are the key focus areas." Proceeds can be invested across four categories: - Environmentally sustainable aquaculture (sustainable feed in line with MSC or IFFP Rs; sustainable fish farming) - Pollution prevention and control (renewable energy installations, carbon footprint reductions) - Water and water waste management (including improving water use efficiency at fresh water and harvesting facilities) - Waste management (including reduction, recycling and reusing of waste)
Geography	Norway, Canada, UK

Impact metrics	Impact metrics include: "**Sustainable feed** - Volume of novel feed ingredients in feed purchased - Volume of feed ingredients that improve fish health and welfare **Sustainable farming** - Number of ASC certified sites financed by Green Bonds - Share of all farms that are ASC certified - Reduction in the number of fish escapes - Improvement in the survival rate - Reduction in number of sea lice treatments - Improvement of benthic results **Pollution prevention and control** - Reduction of GHG emissions [reported as scope 1, 2 and 3 emissions in the Green Bond Report **Water and wastewater management** - Volume of solid sludge collected and treated for re-use - Percentage of water recycled from fresh water facilities [water saved in % and m3/year in the Green Bond report] **Waste management** - Volume/quantity of waste recycled before and after new project/initiative"
Notes	
Sources	(CICERO 2020; Grieg Seafood 2020a, 2020b, 2020c, 2020d, 2022)

NOVEMBER 2020: BANK OF CHINA'S BLUE BOND	
Issuer	Bank of China, Macau Branch and Paris Branch
Amount ($)	942.5M USD
Currency	CNH (3 billion), U.S. dollar (500 million)
Redemption	2 years (CNH), 3 years (U.S. dollar)
Coupon	3.15% at par (CNH), 0.95% at 99.694 (U.S. dollar)
Investors	CNH: 96% sold in Asia, 3% in US, 1% in Europe. 46% to banks and financial institutions, 27% to asset managers, 19% to private banks and 8% to insurers and others. USD: 59% sold in Asia, 41% in EMEA. 42% to banks, 18% to central banks and sovereign wealth funds, 17% to fund managers and asset managers, 10% to corporations, 8% to private banks and others, 5% to insurers.
Concessionary financing	n/a
Other actors	CNH: BOC, Credit Agricole, BNP Paribas, Agricultural Bank of China Hong Kong, Citi, DBS, KGI Asia, Mizuho and Scotiabank (global coordinators) USD: BOC, Credit Agricole, BNP Paribas, Natixis, Société General (global coordinators) ABC Hong Kong, CCB International, China International Capital Corp (lead managers, bookrunners) Ernst & Young (independent external review provider)

Use-of-proceeds	"**Renewable energy**: including the production and transmission of renewable energy, and the manufacturing of renewable energy appliances and products; renewable energy includes solar energy, onshore and offshore wind energy and biomass energy **Sustainable water and wastewater management**: including sustainable infrastructure for clean and/or drinking water, wastewater treatment, sustainable urban drainage systems and river training and other forms of flooding mitigation" The Appendix Report on Pre-Issuance of BOC's 2020 Blue Bonds includes 25 nominated projects for a total of 7.1B RMB. 58% of this amount relates to sustainable water and wastewater management (e.g., marine related sewage treatment project), and 42% relate to offshore wind projects. At the end of 2021, Ernst and Young stated that the full 6.3B RMB (100% of the proceeds) had been disbursed. 79% of this had been allocated to renewable energy, and 21% to sustainable water and wastewater management.
Geography	The Appendix report states the following regions for funding of the nominated projects: 30% Eastern China, 3% Northern China, 54% Southern China, 6% United Kingdom, 7% France. Ernst & Young's statement on the disbursement of proceeds does not mention the real geographical allocation.
Impact metrics	Incremental sewage treatment capacity of 6,176,161 m^3/day. Increase of 2987 MW installed capacity for offshore wind power project. GHG emission reductions. No impact figures are reported in Ernst & Young's statement on the disbursement of proceeds.
Notes	BOC is the first commercial bank to issue a blue bond
Sources	(BOC 2020a, 2020b, 2020c; Davis 2020; Ernst & Young 2020, 2022)

MAY 2021: WORLD BANK & JP MORGAN SUSTAINABLE DEVELOPMENT BOND	
Issuer	World Bank
Amount ($)	10M USD
Currency	Payable in U.S. dollar, but issued in Colombian pesos (37.275 billion)
Redemption	5 years
Coupon	4.75%
Investors	Fiera Capital (sole investor)
Concessionary financing	n/a
Other actors	JP Morgan Securities (lead manager)
Use-of-proceeds	Access to **clean water** and the **sustainable use of ocean and marine resources** (SDG 6 and SDG 14). No specific projects specified. The bond is issued in line with the World Bank's Sustainable Development Bond Framework which mentions the "twin goals of eliminating extreme poverty and promoting shared prosperity".
Geography	IBRD's member countries
Impact metrics	Project-level reporting can be found on the World Bank's website. Project impact reports include detailed information on project name, country, lifetime, target results, and capital. The individual mapping between the sustainability bond issuance and the projects is not publicly available.
Sources	(World Bank 2021a, 2021b, 2021c, 2021d)

JULY 2021: SEASPAN CORP BLUE TRANSITION BOND	
Issuer	Seaspan Corporation
Amount ($)	750M USD
Currency	U.S. dollar
Redemption	8 years
Coupon	5.50%
Investors	Unspecified
Concessionary financing	Unspecified
Other actors	Sustainalytics (SPO)
Use-of-proceeds	**Eligible Projects** under Seaspan's Blue Transition Bond issuance include: - "**Containership newbuilds** targeting decarbonization by utilizing an alternative and/or low-carbon emission fuel source ("**Alternative Fuel Source**"), which is defined as a fuel source that emits less CO2 than a conventional fuel vessel. This includes the use of LNG, bio- or electro-methane, hydrogen, bio-diesel, ammonia or other future commercially viable alternative low or zero carbon fuel source technology - and may include dedicated and **dual-fueled vessels**, utilizing Alternative Fuel Sources - Investment in **R&D, retrofitting, and vessel modifications**, to advance the technical and/or operational efficiency of marine vessels allowing for lower emission intensity through the use of low or zero carbon fuels and/or advanced design and/or propulsion technology" **Eligible containership newbuild projects will feature**: - "Technical specifications consistent with the **Poseidon Principles**, which is aligned with the International Marine Organization's (IMO) goal of at least 50% reduction in total annual GHG emissions by 2050 compared to 2008. These technical specifications may include measures to improve the Energy Efficiency Design Index (EEDI) of the vessel and other widely accepted metrics for carbon emissions - Fuel flexibility and future proofing considerations designed for **lower and zero carbon pathways** such as the transition from LNG to Synthetic or Bio-methane to Hydrogen fuel sources"
Geography	Unspecified
Impact metrics	Reduce GHG emissions by 50% by 2050 compared to 2008, in line with the International Marine Organization's (IMO) goal Sustainalytics (in their SPO) notes that this is not in line with a two-degree climate scenario.
Notes	Seaspan's blue bond is issued in connection with its "Blue Transition Bond Framework", which his aligned with ICMA's Green Bond Principles and the "Climate Transition Finance Handbook 2020".
Sources	(Seaspan 2021a, 2021b; Sustainalytics 2021)

SEPTEMBER 2021: ADB BLUE BOND FOR OCEAN INVESTMENTS	
Issuer	Asian Development Bank (ADB)
Amount ($)	352M USD
Currency	AUD (208 million), NZD (217 million)
Redemption	15 years (AUD), 10 years (NZD)
Coupon	1.8% (AUD), 2.1525% (NZD)
Investors	The Dai-chi Life Insurance Company (AUD), Meiji Yasuda Life Insurance Company (NZD)
Concessionary financing	Unspecified
Other actors	Citigroup Global Markets (arranger, AUD), Credit Agricole CIB (arranger, NZD) CICERO Shades of Green (Second Party Opinion)

Use-of-proceeds	Reduce waste flow to ocean, reduce greenhouse gas emissions, reduce "non-point source pollution to the marine environment from 'source to sea' by supporting green farming and controlling pesticide and fertilizer use" ADB's Blue Bond Framework includes the following projects as eligible to be funded by blue bond proceeds: - "Ecosystem and natural resources management projects: Ecosystem management and natural resources restoration, Sustainable fisheries management, Sustainable aquaculture - Pollution control projects: Solid waste management, Resource efficiency and circular economy, Non-point source pollution, Wastewater management - Sustainable Coastal and Marine Development Projects: Ports and shipping, Marine renewable energy"
Geography	Asia and the Pacific (e.g., Maldives, China)
Impact metrics	Unspecified
Notes	The Blue Bond is part of ADB's "Action Plan for Healthy Oceans and Sustainable Blue Economies launched in 2019, which aims to catalyze sustainable investments in Asia and the Pacific by committing to invest and provide technical assistance of at least $5 billion by 2024".
Sources	(Asian Development Bank 2021a, 2021b, 2022a)

NOVEMBER 2021: IDB INVEST BLUE BOND	
Issuer	Inter-American Investment Corporation (IDB Invest)
Amount ($)	37M USD
Currency	AUD (50 million)
Redemption	10 years
Coupon	2.2%
Investors	Unspecified
Concessionary financing	Unspecified
Other actors	TD Securities (Lead manager)
Use-of-proceeds	Projects contributing to the "UN Sustainable Development Goal 6, expanding clean water and sanitation to people in the region" The bond is issued in line with IDB Invest's "Sustainable Debt Framework". The Framework does not explicitly mention blue bonds but does mention "climate change adaptation and climate resilience" and "sustainable water and wastewater management" in its Green Bond categories.
Geography	Caribbean and Latin America
Impact metrics	Unspecified

Notes	The bond is the first blue bond in Latin America and the Caribbean, and "lays the groundwork for future blue bonds that finance projects in other industries, such as low-carbon and resilient ports, the circular economy and sustainable tourism." IDB Invest released its report "Accelerating Blue Bonds Issuances" together with the UN Global Compact and describes a list of blue projects based on "multi-stakeholder collaboration [which] has contributed to an increasing convergence around what constitutes blue". It mentions the following categories: - **Energy (offshore renewables)**: "Scaling up offshore renewables, increase the renewable energy installed capacity within their portfolio." - **Agribusiness**: "aquaculture/fisheries sector" - **Tourism**, such as "implementation of a zero single-use plastic system", "education programs for sustainable fisheries", "sustainable tourism in marine conservation areas" - **Transport**, including the shipping sector, decarbonization of port operations, "shipping and hinterland transport", "city or region linked" transportation, and the growth of "offshore wind capacity" through port facilities - **Water and sanitation** such as "water and wastewater treatment industries"
Sources	(IDB 2020, 2021a, 2021b)

NOVEMBER 2021: TNC BLUE BONDS FOR CONSERVATION – BELIZE'S BLUE BOND	
Issuer	Government of Belize
Amount ($)	365M USD
Currency	U.S. dollar
Redemption	20 years
Coupon	TBC
Investors	The Nature Conservancy
Concessionary financing	U.S. International Development Finance Corporation (political risk insurance)
Other actors	The Nature Conservancy (initiative taker), Credit Suisse (sole structurer and arranger),
Use-of-proceeds	Marine protection, sustainable economic development and addressing climate change
Geography	Belize
Impact metrics	"Key commitments are as follows: - Completion of a Marine Spatial Plan - Increase in Biodiversity Protection Zones from the current 15.9% of ocean area to 30% of ocean area by 2026 [four years ahead of target] - Of the above 30% of ocean area, designation of half as High Protection (Replenishment Zones) and half as Medium Protection (Multi-use Zones) - Designation of public lands with the Belize Barrier Reef Reserve System – World Heritage Site as Mangrove Reserves - Revision of Belize's Integrated Coastal Zone Management Plan to include marine and coastal biodiversity offsets - Application for three formally designated marine protected areas to be listed as International Union for Conservation of Nature (IUCN) Green List Areas - Implementation of transparent, science based, socially responsible regulations for a high-value, sustainable aquaculture and mariculture industry - Implementation of a governance framework for domestic and high seas fisheries consistent with transparent, science based, socially responsible international best practices - Development and implementation of a national regulatory framework for the development of blue carbon projects within the national carbon strategy

	- Completion of an independent evaluation of the Managed Access Program and reasonable implementation of recommendations - Finalization of revisions to the Environmental Impact Assessment regulations - Meeting or exceeding minimum standards for development in World Heritage Sites - Development of a watershed management plan for at least two major watersheds - Delivery of an annual Conservation Report on the above commitments"
Notes	The financial transaction is set up as a debt-for-nature swap. The proceeds will be used by Belize to repurchase some of its bonds to "reduce debt service costs" by 12% of its GDP. 23.5M USD will be placed into an endowment "that will set aside funding for marine conservation accessible from 2041". In addition, "approximately USD 4 mn annually, paid in Belize dollars, over the next 20 years will flow to a new, independent conservation fund for Belize, which will disburse funds to marine and coastal conservation projects." Belize's Blue Bond is the inaugural transaction part of TNC's "Blue Bonds for Conservation" project which was launched in 2019 and committed 40.5M to refinance 1.6B in debt.
Sources	(Credit Suisse 2021; TNC 2021a, 2021b)

OCTOBER 2022: TMBTHANACHART BANK BLUE BOND	
Issuer	TMBThanachart Bank
Amount ($)	50M USD
Currency	U.S. dollar
Redemption	5 years
Coupon	6 months term SOFR + 1.15%
Investors	International Finance Corporation
Concessionary financing	Unspecified
Other actors	S&P Global (SPO)
Use-of-proceeds	**Renewable energy**, based on following criteria: - "Acquisition, development, operation, and maintenance of equipment, system, licenses, or Power Purchase Agreement, that generate or transmit renewable energy including - Offshore wind, offshore solar, tidal, wave, or ocean thermal energy that do not harm marine ecosystems and may include additional measures promoting marine biodiversity (e.g., fisheries' sanctuaries for juveniles, no-fishing zones, and artificial reefs contributing to natural resource conservation and biodiversity, etc.) - Facilities and infrastructure for the above mentioned e.g., storage, distribution and wholesale and retail facilities, transmission and supporting infrastructure/ system/ technology (such as wind, tidal, and wave turbine generators)." **Sustainable water and wastewater management**: - "Business activities mentioned above in the green criteria must be within 50 km of the coast and/or the marine environment. - Infrastructure aims to prevent or minimize discharges of plastics and chemicals into water sources (e.g., construction and operation of recycling and treatment facilities for packaging waste such as plastic packaging containers, plastic materials, plastic agricultural films, etc.) - Investment in water treatment of shipping and port logistics activities, which comply with national/international standards (e.g., International Convention for the Control and Management of Ships' Ballast Water and Sediments), including but not limited to: - Ballast water treatment and shipping vessels to avoid spread of invasive alien species. - Blackwater and greywater generated from ports and all vessels"

	Pollution prevention and waste management: - "Business activities mentioned above in the green criteria must be within 50 km of the coast or a river that drains to the ocean. - Research, design, manufacturing, trade, or retail of biodegradable plant-based or compostable plastics and packaging. - Research, design, manufacturing, trade, or retail of personal care and household products, including but not limited to: - Biodegradable and phosphate-free detergents, soaps, shampoos, and cleaners. - Biodegradable and phosphate-free cleaner bars and cosmetics without plastic packaging. - Microbead-free toothpaste in non-plastic container. - Use of recycled or reused plastics for manufacturing, plastics collection and recycling facilities, substitution of plastics packaging with sustainable and biodegradable materials, and reuse of plastics in areas connected to water basins. - Research, design, manufacturing, trade, and retail of essential components of the value chain of alternative low carbon and biodegradable materials (e.g., Lyocell) used in medical, apparel, and other industries. The alternative low carbon and biodegradable materials have received or are expected to receive local or international standards/certification/label such as ASTM D6400, ISO17088, TIS 17088, and Carbon Footprint Reduction Label by The Thailand Greenhouse Gas Management Organization. - Reduction or replacement of phosphate- or nitrogen-based synthetic fertilizers with alternative sustainable and organic fertilizers in areas connected to water basins. The alternative sustainable and organic fertilizers meet the organic fertilizer standard by The Office of Agricultural Regulation, Department of Agriculture, Thailand. - Investments in improvement of oil spill management, prevention, and recovery facilities. - Waste disposal facilities at ports and terminals for the collection" **Sustainable management of natural resources**: - "Investments in fisheries or aquaculture to meet or maintain international standards such as the Marine Stewardship Council certification standard, Aquaculture Stewardship Council standard or equivalent. - Production, trade, or retail of seafood products with the blue Marine Stewardship Council or Aquaculture Stewardship Council labels. - Investment in technology, systems, and instruments to measure, track, monitor, and report physical and chemical indicators of water body to attain sustainable fishery and aquaculture management, water-related ecosystem restoration, and disaster resilience. This might include, among other things, drone systems, autonomous sailing vessels and underwater vehicles, and ocean buoys. - Global Sustainable Tourism Council or equivalent certified tourism such as resorts, hotels, boat operators, sailing schools, and diving centers in the vicinity of marine conservation areas, within 20 kilometers from the coastal or marine-protected areas (e.g., marine natural parks of Thailand and internationally recognized marine-protected areas such as Ramsar Sites). - Investment, development, or projects that conserve, improve, or restore mangrove forest, estuary ecosystems, coral reefs, wetlands, marine and coastal ecosystems"
Geography	Unspecified
Impact metrics	TMBThanachart maps its "Green and Blue Bond Framework" to the SDG targets: - **Renewable energy**: Target 7.2, 13.1 and 14.2 - **Sustainable water and wastewater management**: Target 6.1, 6.3 and 6.4 - **Pollution and waste management**: Target 6.3, 9.4, 12.5 and 14.1 - **Sustainable management of natural resources**: Target 11.4, 12.2, 12.4, 12.5, 14.2 and 14.4, 14.5, 15.1, 15.2, 15.5 and 15.a In addition, it mentions several indicators per area, e.g., "Capacity of renewable power projects (MW/Year)", "Marine water quality index (MWQI) in line with local/global standards", etc.
Sources	(IFC 2022e; TMBThanachart 2022a, 2022b, 2022c)

JUNE 2022: BAHAMAS BLUE BLOND	
Issuer	The Commonwealth of The Bahamas
Amount ($)	385M USD (consisting of 135M USD in Series A notes and 250M USD in Series B notes)
Currency	U.S. dollar
Redemption	14 years (Series A notes) and 7 years (Series B notes)
Coupon	3.850% (Series A notes), 9.000% (Series B notes)
Investors	Unspecified
Concessionary financing	Inter-American Development Bank ($200M policy-based guarantee)
Other actors	Goldman Sachs, Oppenheimer & Co (leads)
Use-of-proceeds	Support the blue economy
Geography	Bahamas
Impact metrics	Unspecified
Sources	(Government of The Bahamas 2022; IDB 2022a; West 2022)

JUNE 2022: BDO BLUE BOND	
Issuer	BDO Unibank
Amount ($)	100M USD
Currency	U.S. dollar
Redemption	7 years
Coupon	Unspecified
Investors	International Finance Corporation
Concessionary financing	Unspecified
Other actors	Unspecified
Use-of-proceeds	"Address the depletion of the blue economy and the scarcity of clean water resources, including activities aimed at combating marine plastics, improving ocean projection, and sustainable water management" "Expand financing for projects that help prevent marine pollution and preserve clean water resources, while supporting the country's climate goals"
Geography	Philippines
Impact metrics	Unspecified
Notes	Blue bond adheres to ICMA's Green Bond Principles and IFC's Blue Finance Guidelines IFC will help BDO expand its Sustainable Finance Framework and "launch a framework for blue bond issuance that will help support further issuances in this space"
Sources	(BDO 2022a, 2022b; IFC 2022b)

OCTOBER 2022: BARBADOS BLUE BOND	
Issuer	Government of Barbados
Amount ($)	146.5M USD
Currency	U.S. dollar, local currency
Redemption	15 years
Coupon	Unspecified The debt conversion allowed the Government of Barbados to repurchase a $77.6M 6.500% note due 2029 and a $72.9M "Series E 8% bonds due 2043".
Investors	Unspecified

Concessionary financing	TNC, 50M USD guarantee Inter-American Development Bank (IDB), 100M USD guarantee
Other actors	Credit Suisse (Global Lead Arranger), CIBC FirstCaribbean (Domestic Lead Arranger)
Use-of-proceeds	Ocean economy, water management
Geography	Barbados
Impact metrics	Expand Barbados' marine protected areas to 30%, "including coral reefs, mangroves, fish spawning sites and other important ocean habitats and species as determined from the completion of a holistic, participatory marine spatial planning process that uses the best available science for decision making" Improve marine water management in Barbados
Notes	The debt conversion will free up $50 million "to support environmental and sustainable development actions in Barbados over the next 15 years, making both the country and the livelihoods of its people more resilient in the face of climate change"
Sources	(Government of Barbados 2022a, 2022b; TNC 2022)

OCTOBER 2022: IDB INVEST BLUE BOND (II)	
Issuer	Inter-American Investment Corporation (IDB Invest)
Amount ($)	25M USD
Currency	AUD (38 million)
Redemption	15 years
Coupon	4.55%
Investors	Taiju Life Insurance Company (sole investor)
Concessionary financing	Unspecified
Other actors	Citibank (lead manager)
Use-of-proceeds	"Finance private sector projects that contribute to the UN Sustainable Development Goal 6, Clean Water and Sanitation, and will promote the sustainable use of water resources for economic growth, improved livelihoods, and jobs, as well as ocean conservancy"
Geography	Latin America and the Caribbean
Impact metrics	Unspecified
Notes	The bond is IDB's second blue bond issued in line with its "Sustainable Debt Framework".
Sources	(IDB 2020, 2022d)

OCTOBER 2022: HAINAN BLUE BOND	
Issuer	People's Government of Hainan Province
Amount ($)	167M USD
Currency	CNH (1.2 billion)
Redemption	2 years
Coupon	2.42%
Investors	"International investors, including major international banks, asset management companies and funds"
Concessionary financing	Unspecified
Other actors	Credit Agricole CIB (Joint Lead Manager, Joint Bookrunner), Linklaters, Allen & Overy (legal advisors)
Use-of-proceeds	"Maritime economy and marine protection projects" "Water sanitation, sustainable shipping and port logistics, fisheries and seafood value chain, and marine ecosystem restoration"

Geography	Hainan, China
Impact metrics	Unspecified
Notes	Blue bond was issued in alignment with ICMA and IFC's principles as well as the UN Global Compact
Sources	(Credit Agricole 2022; HKSAR Government 2022; Linklaters 2022)

NOVEMBER 2022: MARUHA NICHIRO CORPORATION'S BLUE BOND	
Issuer	Maruha Nichiro Corporation
Amount ($)	36M USD
Currency	JPY (5 billion)
Redemption	5 years
Coupon	0.55%
Investors	Range of mostly Japanese asset managers, and institutional investors
Concessionary financing	Unspecified
Other actors	Mizuho Securities (lead managing company, financial agent), Mitsubishi UFJ (lead managing company), Morgan Stanley Securities (structuring agent)
Use-of-proceeds	"Environmentally sustainable fisheries and aquaculture operations" Example: "Land-based salmon aquaculture project" Project category: - **Pollution prevention and control** (prevention of ocean pollution) - **Environmentally sustainable management of living natural sources and land use** (environmentally sustainable fishery and aquaculture)
Geography	Unspecified
Impact metrics	Maruha Nichiro mentions SDGs 2, 3, 5, 7, 8, 9, 12, 13, 14 and 15 in its Blue Finance Framework. As an overall company, it has set KPIs to create "Environmental Value". Two relevant areas are: "**Action for Marine Pollution by marine plastics**: practice zero discharge of plastics into the ocean by the company & supply chain." KPIs are: - 100% "establishment of fishing gear management guidelines and operational rates" by 2040 - >30% of "employee participation rate in coastal cleanup" by 2030 "**Action for preserving biodiversity and ecosystem**: confirm that there is no risk of resource depletion in the fish stocks we handle." KPIs are: - 100% "resource status confirmation rate of handled seafood products" by 2030 - "Conduct biodiversity risk assessment" by 2024 - "Implementation of certification level management of aquaculture farms" by 2024
Sources	(Maruha Nichiro Corporation 2022a, 2022b, 2022c)

NOVEMBER 2022: IDB INVEST BLUE BOND (III)	
Issuer	Inter-American Investment Corporation (IDB Invest)
Amount ($)	34M USD
Currency	AUD (50 million)
Redemption	20 years
Coupon	4.90%
Investors	T&D Financial Life Insurance (sole investor)

Concessionary financing	Unspecified
Other actors	Nomura (lead manager)
Use-of-proceeds	"Finance private sector projects that contribute to the UN Sustainable Development Goal 6, Clean Water and Sanitation, and will promote the sustainable use of water resources for economic growth, improved livelihoods, and jobs, as well as ocean conservancy"
Geography	Latin American and the Caribbean
Impact metrics	Unspecified
Notes	The bond is IDB's third blue bond issued in line with its "Sustainable Debt Framework".
Sources	(IDB 2020, 2022c)

NOVEMBER 2022: BANCO INTERNACIONAL BLUE BOND	
Issuer	Banco Internacional
Amount ($)	79M USD
Currency	U.S. dollar
Redemption	4 years
Coupon	TBD
Investors	Other international investors, mobilized by the IFC
Concessionary financing	IFC (40 million)
Other actors	Picaval Casa de Valores (stock brocker), Bondholder Represenatative, Lexvalor (legal advisor)
Use-of-proceeds	"Provide long-term loans and support projects that contribute to a sustainable blue economy and the preservation of clean water resources, including sustainable aquaculture, fishing, and seafood value chain management" "The proceeds of the blue bond will be on-lent exclusively to sub-clients eligible under the IFC's Blue Finance Guidelines. Eligible projects broadly include activities such as sustainable fishing and aquatic farming, water supply and treatment, chemicals and plastics treatment, water and waste management in vessels and shipping yards, licensed sustainable tourism operators, and the manufacturing of ocean-friendly products and offshore renewable energy"
Geography	Ecuador
Impact metrics	Unspecified
Notes	The bond adheres to "ICMA's Green Bond Principles and IFC's Blue Finance Guidelines". IFC will support Banco Internacional in developing its blue finance framework.
Sources	(Banco Internacional 2022; IFC 2022a, 2022d)

NOVEMBER 2022: BRK AMBIENTAL	
Issuer	BRK Ambiental
Amount ($)	380M USD
Currency	Brazilian Real (1.95 billion)
Redemption	20 years
Coupon	Ceiling rate: the maximum of (i) the "Titulo Publico Tesouro IPCA+" + 1.95% and (ii) 7.65% annually Floor rate: the maximum of (i) the "Titulo Publico Tesouro IPCA+" + 1.75% and (ii) 7.45% annually
Investors	Unspecified
Concessionary financing	Unspecified
Other actors	Banco BTG Pactual SA (lead coordinator), Banco Itau BBA, Banco Bradesco BBI, Banco Safra, Santander, UBS BB, XP Investimentos (coordinators)

Use-of-proceeds	"**Sustainable Water and Wastewater Management** - includes the financing of sewage and municipal wastewater treatment systems. - Eligible project is meant to reduce effluents and prevent water and soil contamination. In addition, the project includes improved water management and aims to reduce the ratio of current annual water loss from the distribution system. BRK has confirmed that wastewater from fossil fuels will be excluded. This is in line with market practice. **Affordable Basic Infrastructure** - improve access to potable water, sewage treatment and sanitation - [. . .] the project will mostly benefit municipalities with inadequate infrastructure and aim to improve access to potable and clean water and sanitation that can have the potential to provide additional health benefits to local communities.
Geography	Brazil, Metropolitana de Maceio
Impact metrics	"Volume of wastewater treated; benefited population; population served, average percentage of the population of the municipalities served; number of families served, efficiency of sewage treatment, percentage of water loss, percentage of municipalities with infant mortality rates above the national average, average hospitalization rate due diarrhea in the municipalities (per 1000 inhabitants), average percentage of population with income up to $\frac{1}{2}$ minimum wage; average monthly salary of formal workers (per minimum wage), added treatment volume (sewage: m^3/h, water: L/s), increase in average percentage of population served." "The use of proceeds are expected to provide 90% of the population in the region of Maceió in the state of Alagoas in Brazil with sanitation services until 2037 and reduce water waste to up to 25% over 20 years, impacting 1.5 million people."
Notes	
Sources	(BRK Ambiental 2022a, 2022b; Environmental Finance 2022; Sustainalytics 2022b)

DECEMBER 2022: CENTRAL AMERICAN BANK FOR ECONOMIC INTEGRATION (CABEI)	
Issuer	CABEI
Amount ($)	93M USD
Currency	Tranche AUD: 30 million AUD (21M USD) Tranche JPY: 10 billion JPY (72M USD)
Redemption	5 years
Coupon	AUD: 4.40% JPY: 0.562%
Investors	Unspecified
Concessionary financing	Unspecified
Other actors	Daiwa Capital Markets America (arranger)
Use-of-proceeds	"**Water resources protection**" - Efficient water use (e.g., reduction of water losses of >20%) - Water pollution prevention (e.g., plastic recycling, waste management and disposal) "**Sustainable water management**" - Water distribution (e.g., irrigation, drinking water infrastructure) - Water treatment (e.g., desalination, wastewater treatment) - Water treatment from maritime transportation (e.g., ballast water treatment)

	"**Renewable energy**" - Offshore renewable energy (e.g., power, heat and cooling) "**Blue economy**" - Ports (e.g., water treatment facilities, green transport to hinterland, green ports) - Fisheries, aquaculture and seafood value chain (e.g., sustainable aquaculture production and fisheries) "**Nature protection**" - Water ecosystem protection and restoration (e.g., coastal-marine protected areas, restoration of ecosystems) - Scientific research (e.g., biodiversity, wave energy)
Geography	Central America
Impact metrics	Examples of impact indicators include: "**Water resources protection** - Savings in water consumption of the project (m3) - Increase in water saved (m3) - Reduction in water losses (%) - Amount of pollutants prevented from reaching the water (tons/year; m3/year) - Amount of avoided/reused/recycled plastic (tons/year) **Sustainable water management** - Reduction in water usage (%) - Increase in water reuse (m3/ year) - Increase in solid sludge collected and treated/reused (tons/year) - Number of new connections to drinking water system - Number of new connections to sewerage system **Renewable energy** - Reduced and/or avoided GHG emissions (tCO2e /year) **Blue economy** - Reduced and/or avoided GHG emissions (tCO2e /year) - Savings in water consumption of the project (m3) - Number of beneficiaries - Volume of fishery and aquaculture products produced under sustainability certifications (tons) - Value of fishery and aquaculture products produced under sustainability certifications (USD) **Nature protection** - Area of ecosystems restored (km2) - Surface covered by new protected areas (km2) - Carbon sequestration absorbed from marine ecosystems restored (blue carbon; tCO2e) - Number of scientific articles published"
Notes	
Sources	(CABEI 2022a, 2022b; Sustainalytics 2022a)

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