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Review Article

Green finance frameworks for sustainable shipping industry and blue economy: A review

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Abstract

Oceans, covering over 70 % of the Earth's surface, are critical natural resources that provide indispensable goods and services essential for human well-being. However, current exploitation practices pose significant risks to marine ecosystems and economic stability, with projections estimating the ocean economy's contribution to global GDP between USD 1.5 and 3 trillion annually. This study examines the potential of ocean finance in promoting sustainable development within the maritime industry, focusing on key financial mechanisms, such as loans, grants, and innovative instruments like blue bonds and the Green Shipping Fund. It highlights the existing challenges in securing adequate funding, including significant financing gaps and the need for standardized definitions of 'green' practices in shipping. The analysis underscores the importance of increasing public and private investments, establishing clear regulatory frameworks, and fostering public-private partnerships for advancing a sustainable ocean economy. Ultimately, the findings advocate for collaborative efforts that prioritize ocean health and equity, ensuring the resilience of coastal communities and ecosystems in the face of climate change and resource degradation.

1. Introduction

Oceans, which encompass more than 70 % of the Earth's surface, are essential natural resources that can be likened to forests and soils, forming a critical component of the planet's natural capital. These marine environments provide indispensable resources and services, such as food production, climate stabilization, coastal erosion protection, and cultural significance, all of which are vital for the sustenance of life and the enhancement of human well-being. The oceans are rich in both renewable and non-renewable resources, including fish, oil, and natural gas, which fuel various coastal industries, such as renewable energy production and seafood harvesting. The ocean economy encompasses all economic activities linked to maritime sectors and the advantages offered by marine ecosystems (Patil et al., 2016).

Historically, measuring the ocean economy's contribution to global GDP (Gross Domestic Product) has been challenging; however, recent evaluations suggest it ranges from US$1.5 trillion to $3 trillion annually, representing approximately 3 - 5 % of the global GDP (Global Ocean Commission, 2014). In response to these findings, the OECD (Organization for Economic Co-operation and Development) developed a comprehensive Ocean Economy Database, which in 2010 estimated the ocean economy's value added at around US$1.5 trillion, or roughly 2.5 % of the global

gross value added (OECD, 2016). The impact of the ocean economy is especially significant in coastal and island nations with extensive maritime territories.

Prior to the emergence of the COVID-19 pandemic, projections indicated that the economic contribution of ocean resources could escalate to USD 3 trillion by the year 2030. Nevertheless, this estimation may not adequately capture the full value of the ocean, as it frequently overlooks non-market benefits, including cultural and social dimensions. A study conducted in 2015 suggested that the gross marine product could potentially attain a minimum of USD 2.5 trillion annually when accounting for marine trade, fisheries, coastal ecosystems, and industries such as tourism and carbon offsetting. There exist considerable prospects for expansion in sectors like marine aquaculture, fish processing, offshore wind energy, and shipbuilding (Hoegh-Guldberg et al., 2015).

The vitality of a marine economy is fundamentally dependent on the health and sustainability of oceanic ecosystems. Regrettably, current practices of resource exploitation threaten this sustainability, resulting in significant declines in biodiversity and habitat destruction due to human activities. Historical examples, such as the overfishing of Caribbean coral reefs between the 17th and 19th centuries, have led to a drastic reduction in large fish populations. Presently, challenges such as overfishing, harmful fishing methods, habitat degradation, and pollution pose serious risks to ocean sustainability. Activities like deep-sea mining cause irreversible harm to marine ecosystems, while climate change is instigating transformative alterations that negatively impact ocean health and the ecosystems essential for human welfare (Gaines et al., 2023).

Reports from the IPCC (Intergovernmental Panel on Climate Change) and the Blue Paper on climate change underscore the alarming risks that climate change poses to the ocean economy. The IPCC forecasts that, by the close of the 21st century, oceans may face unparalleled challenges from rising temperatures, increased stratification, acidification, oxygen depletion, shifts in primary productivity, and more frequent marine heatwaves. Even in lower greenhouse gas scenarios, marine ecosystems and species will still be affected. Predicted declines in marine biomass, fish catch potential, and shifts in species distributions will jeopardize the ocean economy, affecting the livelihoods and food security of communities, particularly in tropical areas. Moreover, ongoing losses and the degradation of marine ecosystems will diminish their cultural, recreational, and intrinsic values. The latest IPBES (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services) report highlights a worldwide decline in nature's contributions to humanity, with an alarming 66 % of ocean areas facing growing cumulative impacts (Pörtner et al, 2019).

There is an urgent need to reform current practices to facilitate the development of a sustainable ocean economy (SOE). Although a universally accepted definition of an SOE remains under discussion, the definition that describes it as “advancing the ocean economy in a manner that aligns human requirements, environmental well-being, and economic development” is examined in the Blue Paper on Integrated Ocean Management (Winther et al., 2023). This document underscores the responsible use of ocean resources to maintain the health and resilience of marine ecosystems while promoting employment and livelihoods, thereby achieving a balance between conservation and economic growth (Winther et al., 2023).

Addressing the gaps in the literature surrounding the financing of an SOE is crucial for advancing our understanding of how to effectively transition toward sustainable practices in marine environments. This study is pivotal, as it seeks to explore specific financial strategies, funding sources, and investment frameworks necessary for mobilizing both private and public investment in ocean sustainability. By examining innovative financing mechanisms, such as blue bonds and impact investing, the research can provide valuable insights into how to support sustainable practices across various maritime industries. This study also aims to investigate the integration of existing global financing initiatives, such as the Green Climate Fund, with efforts to bolster the SOE, highlighting both opportunities and challenges.

The methodological approach of the study primarily utilizes a comprehensive literature review and qualitative analysis to explore existing gaps in research and practice. By synthesizing

findings from various reports, studies, and databases, such as the OECD Ocean Economy Database and evaluations from the Intergovernmental Panel on Climate Change (IPCC), the research aims to identify financial strategies, funding sources, and investment frameworks that can mobilize private and public investments towards sustainable ocean practices. The study also examines innovative financing mechanisms, such as blue bonds and impact investing, providing an evaluative framework for assessing their potential in promoting sustainability. Moreover, it discusses the need for standardized definitions and regulatory frameworks that can facilitate investment in the ocean economy while addressing challenges related to market inefficiencies and financing gaps.

The remainder of the study is as follows: section 2 explores the role of ocean finance in supporting sustainable development, highlighting the essential financial mechanisms, the challenges, and the opportunities available for investment in marine conservation and management; section 3 discusses the need for standardized definitions of green practices in shipping, exploring existing initiatives and highlighting the role of crucial organizations; section 4 unfolds the future research initiatives, and section 5 concludes the study.

2. Financing a sustainable ocean economy

2.1 Mobilizing financial resources for ocean sustainability

Ocean finance refers to the mobilization and application of financial resources aimed at supporting activities and governance related to the ocean. For the sustainable development of the ocean economy, it is crucial to ensure an adequate flow of financial resources that are strategically allocated to effectively manage oceanic assets. Key components for financing a sustainable ocean economy include the generation, investment, alignment, and accountability of financial capital. This encompasses a variety of financial instruments accessible to individuals, private enterprises, public entities, and other stakeholders (Núñez-Sánchez & Rojas, 2022).

Financial capital can be utilized in diverse manners to foster a sustainable ocean economy. Enterprises may allocate funds towards the innovation of sustainable products and technologies, while governments and non-governmental organizations can direct investments into conservation efforts or frameworks that encourage private sector participation in sustainable ocean initiatives. Additionally, individuals have the opportunity to invest in businesses that adhere to environmental regulations. Established sectors within the ocean economy, such as shipping, tourism, and energy, frequently seek access to public markets for capital acquisition (Global Ocean Accounts Partnership, 2024).

Financing mechanisms for state-owned enterprises or acquiring new resources for sustainable ocean management encompass a variety of options, including loans, grants, carbon markets, and insurance products. The decision to pursue these financial avenues is frequently influenced by the expected returns and the risk assessments made by potential investors. Ocean finance plays a vital role in reallocating resources towards strategies and policies that address ocean-related challenges while fostering social equity and environmental sustainability. Investments aimed at developing a sustainable ocean economy have the potential to generate competitive returns, thereby attracting private sector funding; however, certain essential investments may yield positive returns that are lower than market rates. The involvement of public or philanthropic co-financing can significantly enhance the attractiveness of private investments. Additionally, funding for critical ecosystem services that do not generate market returns typically depends on public or philanthropic financial support (Sumaila et al., 2021).

2.2 Challenges and opportunities

The justification for investing in a sustainable ocean economy is compelling. Unsustainable practices in resource utilization have resulted in diminished fish populations, loss of biodiversity, heightened pollution levels, and a decline in ecosystems, all of which undermine resilience to global changes and impose substantial economic challenges. Inaction regarding the conservation and sustainable management of ocean resources poses significant financial risks; estimates for coastal

protection costs due to rising sea levels are projected to range from USD 200 billion to USD 1 trillion annually by the year 2100. Furthermore, a one-meter increase in sea levels under specific climate scenarios could lead to expenses surpassing USD 322 billion each year by 2050, adversely affecting fisheries, tourism, and the ocean's capacity for carbon absorption (UNSW, 2024).

Despite the evident necessity for financial investment, support for the ocean economy is insufficient, resulting in considerable funding deficits. For instance, Marine Protected Areas (MPAs), which are crucial for the preservation of marine ecosystems, are facing significant financial shortfalls. In the Mediterranean region alone, the annual funding gap for effective MPA management is estimated at USD 776.4 million, while global maintenance costs for MPAs in 2018 amounted to USD 2.3 billion, with merely 2.3 % of these areas designated as Highly or Fully Protected. To achieve the target of 10 % protected areas, an estimated USD 7.7 billion is needed on a global scale. Sustainable Development Goal (SDG) 14, which addresses life below water, currently attracts the least impact investment among all SDGs, underscoring the urgent requirement for enhanced efforts to bolster ocean financing (UNEP, 2006).

The current “business as usual” paradigm poses significant risks to ocean users and jeopardizes the livelihoods of millions residing in coastal and island communities. This paradigm is fundamentally incompatible with the 2030 Agenda for Sustainable Development and undermines the objectives of all 17 SDGs, with particular emphasis on SDG 14, as well as those related to hunger, poverty alleviation, economic growth, and climate action.

An assessment reveals that the global financing shortfall for ecosystem conservation, which includes support for a sustainable ocean economy, amounts to approximately USD 300 billion. Although the precise deficit for ocean-related initiatives remains unspecified, it is anticipated to be considerable. To address the global financing requirements for conservation, funding for marine initiatives must increase dramatically- potentially by a factor of 20 to 30 compared to current levels. Current reports indicate that a mere 0.002 % of global GDP is allocated to conservation efforts, highlighting the necessity for a fourfold increase in investments to fulfill ecological demands, thereby illustrating the insufficiency of existing funding for a sustainable ocean economy (OECD, 2020).

To enhance financing for a sustainable ocean economy, it is essential to address three primary obstacles that impede sufficient ocean finance. The first obstacle pertains to the necessity of establishing an environment conducive to attracting such financial resources. Public policy initiatives, including the allocation of subsidies, are vital in creating a supportive framework for sustainable investment. The second and third obstacles relate to the domains of finance, investment, insurance, and risk management strategies.

An enabling environment is imperative for the implementation of effective regulations and stable policies that draw investment into the ocean economy. The current financial ecosystem lacks the necessary allure, thereby failing to adequately promote sustainable investments. In particular, the existing regulatory frameworks that encourage the sustainable management of natural resources and bolster social enterprises are both inadequate and lacking in both quantity and quality (Hoegh-Guldberg, 2015).

A lack of comprehensive data regarding the economic, social, and environmental roles of the ocean significantly obstructs financing initiatives. To facilitate adequate funding, it is essential to develop a thorough understanding and enhanced metrics of the ocean economy's effects. Furthermore, the existing data on ocean finance frequently lacks detailed specificity within national accounts. However, emerging research is beginning to shed light on the economic significance of the ocean. For example, the estimated gross marine product of USD 2.5 trillion suggests that, if the ocean were treated as a sovereign entity, it would rank as the seventh-largest economy globally. Given that this figure is somewhat outdated, the true contribution of the ocean economy is likely to be even higher. Many current studies overlook the extensive range of services provided by the ocean that typically do not have market valuations, including natural disaster mitigation, carbon sequestration, climate support, and pollution management (Hoegh-Guldberg, 2015).

Market inefficiencies pose substantial challenges to the sustainability of the ocean economy. Economic activities that generate negative externalities, such as fossil fuel extraction, unsustainable fishing practices, and environmentally harmful shipping, often receive subsidies. The International Monetary Fund has reported that fossil fuel subsidies accounted for approximately 6.3 % of global GDP in 2015, equating to around USD 4.7 trillion, which encompassed support for both marine and terrestrial sectors. Additionally, marine fisheries benefit from annual subsidies totaling USD 35 billion, with USD 22 billion classified as harmful subsidies that contribute to overfishing. According to the OECD, member nations provide support equivalent to about 20 % of the value of fish landings, amounting to roughly USD 7 billion annually. A considerable share of these funds tends to favor large industrial operations, thereby complicating the circumstances for small-scale enterprises (Lee & Nam, 2017; Coady et al., 2019; Schuhbauer et al., 2017).

The ocean economy presents significant economic advantages, particularly for coastal nations, yet those who reap these benefits often fail to invest adequately in the access, utilization, or management of marine resources. For instance, countries in East Asia enjoy economic contributions from their ocean economies that range from 15 to 20 % of their GDP, while Mauritius sees over 10 %. Despite these substantial profits, there is a notable lack of investment in the stewardship of ocean resources, leading to financial deficiencies in ocean governance. This neglect adversely affects the health of ocean ecosystems, which are essential for maintaining these economic gains. The private sector, while profiting from ocean resources, typically does not make sufficient contributions to initiatives aimed at managing these resources (Economic Development Board Mauritius, 2020).

Currently, there is no widely accepted framework or system to guide investments toward an SOE. There is an immediate need for a classification system that can identify activities contributing to a sustainable ocean economy, often referred to as “blue” investments. Such a system could significantly influence investment decisions and development strategies that promote an SOE. A relevant example is the UNEP (United Nations Environment Programme) Sustainable Blue Economy Finance Principles, which involve collaboration between the UNEP and financial institutions to incorporate environmental, social, and governance factors into their operations, thereby enhancing sustainability in financial markets. Although efforts are underway to create unified frameworks and classifications, such as those proposed by the Asian Development Bank, the lack of a definitive and widely accepted structure hinders investment flows and the formulation of development policies aimed at advancing an SOE (UNEP, 2020; ADB, 2020).

In this scenario, the financing and investment landscape encounters obstacles due to the scarcity of high-quality projects that fulfill appropriate deal sizes and risk-return parameters necessary for alignment with available capital. Despite a global excess of investment resources, there exists a notable shortfall of feasible projects capable of supporting a state-owned enterprise. Numerous marine initiatives necessitate grant funding, often yielding minimal or no financial returns. For the limited number of projects that do generate profits, they frequently (1) are too small to be viable once due diligence costs are considered, and (2) possess a higher risk-return profile due to the inherent uncertainties associated with ocean-related economic activities in contrast to those on land (Österblom, 2020).

The accessibility of financing for ocean-related projects is inadequate and often unevenly allocated. While only a limited number of stakeholders reap the benefits of ocean resources, marginalized communities, including women and youth, disproportionately bear the burdens associated with ocean-based economic activities. This disparity is intensified by fossil fuel subsidies that predominantly advantage large corporations, thereby perpetuating inequality and distorting the distribution of economic benefits derived from ocean resources. Considering the vital contribution of small-scale ocean economies to global food security and livelihoods, public policy should not marginalize these sectors, aligning instead with SDGs 1 - 5 and 10 (**Table 1**), which emphasize poverty alleviation, food security, health, education, gender equality, and the reduction of inequality (Österblom, 2020).

Table 1 Key points of the challenges and opportunities within the SOE.

Current State of the Ocean Economy	Financing Gaps
Declining Ecosystem Health	**Funding Shortfalls in Marine Conservation**
Diminished fish populations, loss of biodiversity	Global financing gap for ecosystem conservation (~USD 300 billion)
Heightened pollution and ecosystem degradation	Marine conservation financing must increase by 20 - 30 times current levels
Rising Economic Risks	**Inadequate Allocation of Resources**
Coastal protection costs (USD 200 billion to USD 1 trillion annually by 2100)	0.002 % of global GDP allocated to conservation efforts
Economic impacts of rising sea levels (USD 322 billion annually by 2050)	Limited funding for marine-related initiatives
Insufficient Investment	
Funding deficits for Marine Protected Areas (MPAs)	
SDG 14 (Life Below Water) receives minimal impact investment	
Obstacles to Sustainable Ocean Finance	**Pathways for Improvement**
Lack of Enabling Environment	**Need for a Unified Framework**
Insufficient public policies and subsidies for sustainable ocean investment	Classification systems for blue investments
Weak regulatory frameworks for natural resource management	Examples: UNEP Sustainable Blue Economy Finance Principles, ADB framework
Data and Knowledge Gaps	**Developing Feasible Projects**
Lack of comprehensive ocean economy data	Scarcity of high-quality, bankable projects
Incomplete national accounts for ocean finance	Ocean projects often require grant funding or are too small to be profitable
Market Inefficiencies	**Increasing Inclusivity in Ocean Economies**
Fossil fuel subsidies (USD 4.7 trillion in 2015)	Marginalized communities (e.g., women, youth) bear disproportionate burdens
Harmful subsidies for marine fisheries contributing to overfishing	Policies should align with SDGs 1 - 5 and 10 to reduce inequality and support small-scale enterprises
Limited Investment in Ocean Resource Management	
Coastal nations profiting from ocean economies, yet under-investing in resource stewardship	
Risk Management and Insurance Challenges	**Strategic Solutions**
Complex Risk Profiles	**Public Policy and Investment Incentives**
Ocean investments have higher risk-return profiles than land-based activities	Create supportive policies and subsidies for sustainable ocean projects
Limited coverage by traditional marine insurance	Improve regulatory frameworks and stable policies
Insurance Gaps	**Risk Mitigation**
Marine insurance does not cover all ocean economy risks (e.g., blue carbon, nature-based infrastructure)	Alternative risk management strategies beyond traditional insurance
Smaller enterprises face barriers in accessing insurance due to high costs and limited availability	Public-private partnerships to reduce investment risks

Source: Author's compilation

The intricate risk profiles associated with ocean investments pose significant challenges for insurance and risk management, while the current regulatory frameworks fall short of effectively attracting investors. To address the heightened risks inherent in the ocean sector, it is essential to focus on several enabling conditions. These encompass issues related to human expertise, the availability of data, and operational risks. Moreover, the distinctive characteristics of ocean-related activities hinder the scaling and replication processes when compared to more established land-based industries, particularly in terms of ownership rights, monitoring, and regulatory enforcement. To draw substantial investment, it is crucial to implement strategies that reduce the risks associated with sustainable development initiatives in the ocean sector. Although marine insurance can mitigate certain commercial risks in domains such as shipping and aquaculture, it fails to cover all risks within the ocean economy, including those associated with blue carbon and nature-based infrastructure. Furthermore, smaller enterprises may be reluctant to pursue insurance options due to concerns regarding cost and accessibility, underscoring the necessity for alternative risk mitigation strategies (Mumford et al., 2009).

3. Towards a unified green finance framework for the shipping industry

The global shipping industry exerts a significant influence, indicating that the establishment of a standardized approach to categorizing 'green' practices could facilitate the sector's advancement in achieving the objectives set by the International Maritime Organization (IMO). The maritime industry, in conjunction with the broader marine economy and its financial systems, has evolved into an integrated international framework. Presently, many financial institutions possess greater leverage than individual countries in promoting and enforcing sustainable practices. As a result, the criticisms aimed at unilateral actions in public law are equally applicable to private entities. While state-owned enterprises and developmental projects may have a more substantial impact on the progression of specific sectors, the shipping industry- defined by its transnational characteristics- urgently necessitates a unified set of environmental regulations and fundamental standards to encourage widespread support for green initiatives (Wang and Song, 2020).

The IMO has reaffirmed its commitment to fostering environmental sustainability by endorsing the United Nations' 2030 SDGs. These objectives are designed to steer global initiatives aimed at enhancing the shipping industry; however, there is a significant lack of explicit guidelines concerning green financing within this domain. In light of climate change, the IMO implemented the Energy Efficiency Design Index (EEDI), which has been compulsory for newly constructed vessels since 2011. Additionally, during the Marine Environment Protection Committee (MEPC) meeting in July 2011, the IMO required the establishment of the Ship Energy Efficiency Management Plan (SEEMP) for all maritime vessels. The EEDI functions as a performance-oriented benchmark intended to diminish carbon emissions associated with fuel usage, granting shipbuilders and operators the latitude to select technologies and designs that fulfill energy efficiency standards (Gavalas et al., 2022).

While this latitude encourages innovation, it simultaneously introduces ambiguities in financial arrangements, necessitating clear definitions of risks, responsibilities, and objectives. The accessibility of funding for green technologies is heavily reliant on well-defined technical standards. Nonetheless, issues related to methane slip- where methane does not combust completely in natural gas engines- cast doubt on the environmental advantages of Liquified Natural Gas (LNG) technology. Given that methane possesses a global warming potential 36 times that of CO2, even minor leaks can significantly intensify global warming. Consequently, it is imperative for the financial sector to assess whether LNG genuinely qualifies as a 'green' fuel option, or if it occupies a more ambiguous status among environmentally friendly alternatives. This assessment is vital for sustaining investor confidence, as stakeholders require assurance that such technologies contribute to enduring environmental sustainability and align with the overarching objective of achieving carbon neutrality (Wang & Notteboom, 2014).

It is widely recognized that traditional capital budgeting approaches often see multiple projects vying for financial resources, where conventional shipping vessels- lacking environmentally friendly or energy-efficient attributes- compete against greener alternatives that may not always appear economically viable. Consequently, investments in energy-efficient technologies frequently receive lower priority. Nevertheless, emerging funding opportunities for sustainable shipping are starting to emerge, primarily centered on energy and development projects. Financial institutions have a pivotal role in advancing sustainable practices by providing "green" or "sustainable" loans to shipping firms, designed to support initiatives that align with or surpass the benchmarks set by the IMO.

From a legal standpoint, it is essential to create explicit policy frameworks and definitions for "green" covenants to ensure appropriate risk allocation and accountability in commercial transactions. The ramifications of green finance are significant, as its principles can affect more than mere financial dealings; they have the potential to influence various dimensions of the shipping sector. Although these principles may be propelled by governmental and institutional efforts, their effects are likely to permeate subcontracting and other shipping-related activities. Financing agreements could play a critical role in integrating "green principles" into contract law, potentially elevating them to the status of fundamental concepts such as "good faith" and "cooperation."

Regional organizations, such as the European Investment Bank (EIB), have been at the forefront of promoting green finance within the shipping sector by providing tailored financial instruments aimed at aiding maritime enterprises in meeting the changing standards and objectives set by the IMO. In contrast, countries with substantial shipping finance portfolios, such as Greece (which will be discussed in greater detail), have shown robust support for the 2030 Sustainable Development Goals and IMO objectives, while integrating shipping into wider "green finance" strategies. The following sections will delve into the challenges encountered by both approaches, particularly the absence of a specific classification system to identify qualifying green shipping activities.

3.1 EIB's green finance initiatives for sustainable shipping

For the European Investment Bank (EIB), the market is characterized by complexities that can hinder the identification of appropriate projects. Various policies influence this situation, but meeting all policy stipulations can prove difficult, and the standard contractual terms employed by the bank do not adequately clarify the definition of green activities.

The Green Shipping Loan Programme, with a budget of EUR 250 million, primarily targets shipowners in the Mediterranean and Atlantic regions who are seeking funds to build new vessels for approved projects. These projects must meet the EIB's lending criteria and demonstrate strong European interest, covering up to 50 % of the investment. The CEF (Connecting Europe Facility) enables the creation of new financial instruments that assist projects, especially those aimed at meeting EU emission regulations. The EIB acknowledges the significant investment challenges faced by the maritime industry, such as perceived risks and a reluctance among commercial lenders to fund eco-friendly upgrades. To address these issues, the platform works to reduce risks associated with environmental investments and encourages fleet modernization. The GSGP operates on a risk-sharing model, where the EIB offers guarantees to secure senior debt and, when appropriate, may also back subordinated debt (Chuah, 2020).

The financial products tailored for the shipping sector are gaining prominence as environmental regulations become more stringent, leading to increased costs for industry stakeholders. Nonetheless, there exists a pressing need for improved alignment between the financing-eligible projects and the overarching objectives outlined in the EU's shipping agenda. This situation underscores the challenges associated with converting public environmental policies into viable commercial agreements, especially in the presence of ambiguities within existing frameworks and competing policy goals. To streamline this process, the EIB implemented standardized contracts

in 2014, which delineate the environmental obligations of borrowers. These obligations include (i) executing projects in accordance with environmental legislation, (ii) securing and upholding necessary environmental permits, and (iii) complying with these regulations. The environmental stipulations for borrowers are connected to pertinent national and EU laws, as well as international standards aimed at safeguarding or enhancing the environment. Additionally, the term "environmental approval" encompasses any requisite authorization under environmental legislation. Clause 1(g) broadly characterizes "environment" to include not only the natural surroundings, but also built environments, taking into account occupational and community health and safety, particularly in relation to human welfare. Consequently, borrowers must adhere to EU environmental regulations, which are further influenced by the EIB's legal framework and policy aims (Ballad et al., 2022).

Comprehending the legal context in which the EIB functions is crucial for understanding its contribution to the EU's broader objectives. The EIB offers long-term financing, guarantees, and advisory support for major projects under legislation that permits it to provide loans and guarantees for investments in three primary domains: 1) Development projects for economically disadvantaged regions, 2) Initiatives aimed at modernizing businesses or fostering new activities related to market integration, and 3) Projects of mutual interest among member states.

The Transport Lending Policy of the EIB emphasizes its commitment to the Trans-European Transport Network (TEN-T) while integrating considerations related to climate change. The TEN-T framework is centered around two main components: the "Motorways of the Sea" (MoS) and the European Railway Transport Management System (ERTMS). To facilitate the execution of these projects, specific coordinators have been appointed, and a work plan was developed in 2015, with provisions for regular updates, the next major review anticipated in 2023.

A significant element of the EIB's financing for green shipping through the Connecting Europe Facility is the MoS initiative, which includes "short-sea routes, ports, associated maritime infrastructure, facilities, equipment, and administrative processes." The MoS aims to establish a "European Maritime Transport Space without barriers," enhancing the integration of maritime and inland transport through Core Network Corridors. A primary goal of the MoS is to advance clean maritime transport, thereby aiding in the reduction of greenhouse gas emissions (CO_2) to address climate change. The 2013 TEN-T Guidelines designate MoS as the maritime segment of the trans-European transport network, aiming to create a "European maritime space without barriers," which encompasses: a) improved connectivity among ports, b) development of port infrastructure, freight terminals, and logistics facilities, and c) infrastructure that supports seamless access between land and sea.

Sustainability is a fundamental aim of the MoS initiative; however, the TEN-T Guidelines prioritize development, with sustainability addressed more broadly under "Sustainable Freight Transport Services" in Article 32. The environmental aspect of sustainability in this context emphasizes "reducing carbon dioxide emissions and mitigating negative environmental impacts." While there exists the potential for "Projects of common interest for motorways of the sea" to encompass environmentally beneficial initiatives, adherence to these targets is not mandatory. Such projects may involve the establishment of maritime MoS connections or wider "benefit actions." Although the European Union promotes the use of alternative fuels and energy-efficient shipping methods, such as LNG, the specific role of green shipping within the MoS framework remains somewhat unclear (Rebelo, 2020).

As previously highlighted, the participation of ports and the development of infrastructure to alleviate transport congestion are essential. Consequently, projects seeking funding related to MoS must demonstrate clear connections to EU ports or infrastructure that align with MoS objectives. This stipulation poses challenges for smaller maritime operators in securing funding to meet IMO or EU environmental standards, as these initiatives typically concentrate on large-scale port and

infrastructure projects. Likewise, companies engaged in ocean shipping may find themselves marginalized within the MoS policy framework.

In December 2021, the European Union implemented the "Taxonomy Regulation," which is designed to create a uniform system for classifying sustainable investments. This regulation aims to establish a coherent framework across the EU for identifying activities that are environmentally sustainable, thereby playing a vital role in facilitating the energy transition and ensuring that investments align with the EU's environmental goals. The groundwork for this regulation was established in 2019, when the European Council and Parliament reached an agreement on the Taxonomy framework as part of the EU's Action Plan on Financing Sustainable Growth. This initiative seeks to prevent fragmentation among EU member states and institutions, direct investments towards sustainable development, and reduce the risk of "greenwashing." As a component of the Action Plan, the European Commission formed the Technical Expert Group on Sustainable Finance (TEG) to create criteria for evaluating activities that significantly contribute to environmental sustainability. The final report from the TEG will provide recommendations to the European Commission regarding the structure of the Taxonomy and the methods for ensuring adherence to its disclosure requirements (EU Technical Expert Group on Sustainable Finance, 2020).

3.2 Blue bonds

A blue bond represents an innovative financial instrument aimed at financing projects related to marine and oceanic environments, fostering both ecological sustainability and economic development. Much like conventional bonds, blue bonds are issued by entities such as governments, development banks, or corporations, allowing investors to provide capital in exchange for periodic interest payments and the return of the principal amount upon maturity. The capital generated through blue bonds is specifically directed towards "blue projects," which are initiatives that promote sustainable practices in ocean and marine sectors, thereby supporting the overarching objectives of the Mission Ocean initiative[a] and aligning with various Sustainable Development Goals (SDGs). Notably, these bonds primarily advance SDGs 6 (Clean Water and Sanitation) and 14 (Life Below Water), while also offering ancillary benefits to SDGs 2, 7, 12, 13, and 15. To be classified as a blue project, an initiative generally needs to adhere to the standards set for green bonds and green loans, with a focus on achieving quantifiable outcomes in accordance with SDGs 6 or 14.

Blue bonds can be classified according to the nature of the issuer or beneficiary, and they may be categorized as either private or public. Private blue bonds, for instance, are often issued for specific corporate or project-related objectives, facilitating the development or reconfiguration of marine-oriented projects such as offshore wind farms. The repayment of these bonds is typically sourced from the revenue generated by the project itself, independent of other income sources. They may be listed on stock exchanges or traded privately, appealing to long-term investors, including pension funds and insurance companies, due to their fixed interest rates and longer maturities. These bonds are particularly advantageous for substantial maritime infrastructure and renewable marine energy initiatives, while also being applicable to a range of other marine sustainability projects that align with the SDGs.

Public blue bonds are issued by governmental or municipal entities, and generally present a lower risk profile compared to private bonds which, in turn, leads to a reduced yield or coupon rate. The issuers of blue bonds encompass a variety of entities, including national governments, local authorities, financial institutions, multilateral development banks (MDBs), and private corporations. These bonds appeal to a diverse array of investors, ranging from private sector participants such as

[a]Mission Ocean initiative refers to the EU Mission: Restore our Ocean and Waters. It's a major initiative launched by the European Union as part of its Horizon Europe research and innovation program. The mission's primary goal is to protect and restore the health of oceans, seas, and waters by 2030.

venture capital firms, angel investors[b], and family offices, to public financial institutions like sovereign wealth funds and development banks.

Blue bonds provide several notable benefits relative to other financial instruments: (i) they are specifically structured to finance initiatives that align with the three primary goals of the Mission Ocean initiative: the protection and restoration of marine and freshwater ecosystems, the mitigation of marine pollution, and the promotion of a carbon-neutral and circular blue economy; (ii) they serve as a vital mechanism for directing private investment into projects that enhance ocean health, particularly in Small Island Developing States (SIDS), where economic stability is closely linked to the health of marine environments. By funding a variety of projects, blue bonds can facilitate the mobilization of additional resources, improve project implementation, and foster positive outcomes for the blue economy in regions struggling to achieve sustainable development; (iii) beyond marine conservation, blue bonds also contribute to broader sustainability objectives, including social inclusion, economic growth, and environmental stewardship, thereby directly addressing ocean-related issues and aiding in the realization of the Sustainable Development Goals (Koondee et al., 2022).

The engagement of the private sector in blue bonds can be enhanced through the provision of technical assistance and de-risking capital by public institutions, thereby fostering public-private partnerships that yield advantages for both private investors and the national blue economy. Furthermore, these bonds serve to elevate awareness regarding the significance of marine and oceanic resources, thereby involving both public and private entities in efforts aimed at conservation and sustainable development.

However, blue bonds are not without their criticisms: (i) thematic bonds, including blue bonds, do not inherently offer lower costs compared to traditional bonds. The pricing of a bond is predominantly determined by the issuer's creditworthiness, which is influenced by factors such as the project's credibility and prevailing market conditions, rather than the bond's environmental objectives; (ii) there exists a concern that the capital raised through blue bonds may not be fully allocated to marine-related initiatives. To ensure transparency and accountability, issuers are required to implement comprehensive measurement, reporting, and verification (MRV) systems, which can be intricate, resource-demanding, and difficult to sustain. Additionally, accurately demonstrating the environmental benefits of these investments poses a significant challenge; (iii) the allocation of funds for designated projects may restrict the issuer's flexibility in capital management, potentially resulting in either an excess or deficiency of funds for specific initiatives. Moreover, reconciling obligations to bondholders with fiscal limitations may lead to compromises that diminish funding for other essential development sectors (European Commission, 2019).

To address these challenges, various institutions, including development banks and private investors, have begun to explore innovative financial solutions that can both support marine conservation efforts and attract capital to sustainable ocean-related projects. Among these solutions, blue bonds have emerged as a promising tool to mobilize funds specifically for marine and oceanic environmental projects. The introduction of blue bonds by entities like the World Bank marks a significant step forward in financing sustainable marine initiatives, as these instruments offer an opportunity to channel private and institutional investments into projects that align with global sustainability goals. This move is especially crucial given the growing urgency of tackling marine plastic pollution and preserving marine ecosystems, which are vital to both environmental health and economic prosperity. Through such initiatives, blue bonds can help bridge the funding gap for marine conservation and enhance the effectiveness of sustainable development in marine and coastal regions.

In this context, the World Bank (WB) has introduced a Blue Development Bond designed to draw attention to the critical issue of marine plastic pollution. This initiative is part of the WB's

[b]Angel investors are individuals who provide financial backing to early-stage startups or small businesses, typically in exchange for ownership equity or convertible debt. Unlike venture capital firms, which manage pooled funds from multiple investors, angel investors usually invest their own personal funds.

ongoing efforts to engage investors and highlight the importance of safeguarding freshwater and marine ecosystems. The bond, structured as a callable stepped-up fixed-rate instrument, was aimed at both individual and institutional investors. It successfully priced on June 15, 2022, raising a significant USD 15,000,000. J.P. Morgan Securities LLC served as the exclusive distributor for this bond. Aligned with the sustainability bond guidelines established by the International Capital Markets Association (ICMA), the bond supports the achievement of SDG 14 (Life Below Water) and SDG 6 (Clean Water & Sanitation). Specifically, it is intended to fund a range of projects, including large-scale regional fisheries programs, water pollution reduction initiatives, improvements in water sanitation, and the promotion of sustainable coastal development.

The World Bank Blue Bond (main features shown in **Table 2**), rated Aaa/AAA by Moody's and S&P, reflects robust creditworthiness. Issued in a denomination of USD 1,000 and multiples thereof, the bond raised USD 10 million, settling on April 24, 2019, and maturing on April 24, 2022. Offering a step-up coupon schedule, the bond provided annual rates of 2.35, 2.70, and 3.15 % over three years. Managed by Morgan Stanley & Co. LLC, with DTC as the clearing system, this bond underscores the World Bank's commitment to sustainable financing initiatives.

Table 2 World Bank Blue Bond- features summary.

Rating	Aaa/AAA (Moody's/S&Ps)
Issue Amount	USD 10 mn.
Settlement Date	24-Apr-19
Coupon	Step up Schedule: Year 1: 2.35 % Year 2: 2.70 % Year 3: 3.15 %
Maturity Date	24-Apr-22
Denomination	USD 1,000 and integral multiples of USD 1,000 in excess thereof
Clearing System	DTC
Lead Manager	Morgan Stanley & Co LLC

Source: World Bank Group (2019)

The mechanisms presented in the World Bank's Sustainable Development Bond initiative, while innovative and significant in raising awareness about plastic waste pollution in oceans, face several risks and limitations. Firstly, the inherent challenge of addressing plastic waste involves complexities that extend beyond financial instruments; it requires coordinated regulatory frameworks, effective waste management systems, and robust enforcement mechanisms across various jurisdictions. The bond, while a valuable fundraising tool, may not directly translate to immediate or tangible solutions to the crisis, especially if the projects financed are not adequately monitored or evaluated for impact. Additionally, investor engagement and awareness are contingent on the willingness of private sector stakeholders to adopt sustainable practices, which may vary significantly among different entities and regions, leading to inconsistencies in commitment levels.

Moreover, the financial implications of such bonds are twofold: while they serve to fund crucial conservation projects, they may also limit the World Bank's ability to invest in other pressing developmental needs if funds are disproportionately allocated toward environmental initiatives. Furthermore, there exists a risk of "greenwashing," where investments are marketed as environmentally friendly without delivering measurable impact, potentially undermining the credibility of the initiative and investor trust. The complex interplay between environmental outcomes

and financial returns means investors might face uncertainty regarding the efficacy of their contributions to significant ecological issues like plastic waste management.

3.3 The green shipping fund

The Green Shipping Fund represents a €420 million private debt initiative designed to offer financial support to shipowners for the acquisition of new vessels or the retrofitting of existing ones, provided that these vessels comply with Environmental, Social, and Governance (ESG) criteria and contribute to emission reductions in alignment with the IMO's objectives for 2030 and 2050, as well as the European Union's Green Deal.

To be eligible for funding, vessels must meet specific criteria, which include: (i) utilizing low-emission fuels such as LNG, LPG (Liquefied Petroleum Gas), methanol, or hydrogen, (ii) being fully electric, (iii) incorporating a hybrid system that combines electric propulsion with either Marine Gas Oil (MGO) or low-emission fuels, or (iv) operating exclusively on alternative fuels where feasible and enforceable. The fund typically provides between €15 million and €50 million, extending senior secured loans to owners and operators of both short- and long-range vessels within Europe.

This initiative is in alignment with the United Nations' Sustainable Development Goals, particularly emphasizing Goal 7 (Affordable and Clean Energy) and Goal 13 (Climate Action). The Green Shipping Fund aims to promote a transition towards zero-emission shipping and offers a sustainable, long-term alternative to traditional maritime financing options.

Table 3 Green issuances in the maritime sector in 2024.

Date	Company	Exchange	Company Sector	Type	Further Details	USD Equiv.	Coupon Rate	Maturity
1/9/2024	Iberdrola SA	Bolsa de Madrid	Other	Bond	Green Hybrid Bonds	765,800,000	4.871 %	n/a
1/19/2024	Mitsui OSK Lines	Tokyo Stock Exchange (TSE)	Ship Owner - Diverse	Bond	Blue Bond	135,099,584	0.639 %	1/1/2028
1/23/2024	Enel	Borsa Italiana	Other	Bond	Sustainability Linked Bonds	816,525,000	3.375 %	7/23/2028
1/23/2024	Enel	Borsa Italiana	Other	Bond	Sustainability Linked Bonds	1,088,700,000	3.875 %	1/23/2035
1/26/2024	Nippon Yusen Kaisha	Tokyo Stock Exchange (TSE)	Ship Owner - Diverse	Loan	Sustainability Loan	300,000,000		
3/6/2024	ENGIE	Euronext Paris	Other	Bond	Green Bonds	869,920,000	3.875 %	3/6/2036
3/6/2024	ENGIE	Euronext Paris	Other	Bond	Green Bond	652,440,000	4.250 %	3/6/2044
3/7/2024	Cadeler	Oslo Bors	Offshore	Loan	Unsecured Green Term Loan	87,160,000	n/a	n/a
3/14/2024	TenneT		Other	Bond	Green Bond	600,875,000	4.625 %	n/a
3/14/2024	TenneT		Other	Bond	Green Bond	600,875,000	4.875 %	n/a
3/22/2024	ENN Natural Gas	Shanghai Stock Exchange	Oil / Gas / Chemical	Bond	n/a	140,837,136	2.65 %	3/22/2027
4/1/2024	Odfjell ASA	Oslo Bors	Ship Owner - Tanker	Loan	Transition Linked Loan	70,000,000	n/a	n/a
4/5/2024	SFL Corporation	New York Stock Exchange (NYSE)	Ship Owner - Diverse	Bond	Senior Secured Sustainability linked Bond	150,000,000	8.25 %	4/5/2028

Table 3 (continued) Green issuances in the maritime sector in 2024.

Date	Company	Exchange	Company Sector	Type	Further Details	USD Equiv.	Coupon Rate	Maturity
4/12/2024	Huaneng Power Intl	Hong Kong Stock Exchange	Other	Bond	n/a	345,422,471	2.20 %	4/12/2027
4/12/2024	RWE	Frankfurt Stock Exchange	Other	Bond	Green Bond	1,000,000,000	5.875 %	4/12/2034
4/12/2024	RWE	Frankfurt Stock Exchange	Other	Bond	Green Bonds	1,000,000,000	6.25 %	4/12/2054
4/17/2024	Nippon Yusen Kaisha	Tokyo Stock Exchange (TSE)	Ship Owner - Diverse	Bond	Green Bond	646,529,719	1.175 %	4/17/2034
5/2/2024	ABO Wind		Other	Bond	Green Bonds	69,537,000	7.75 %	11/8/2029
5/14/2024	KCC AS	Oslo Bors	Ship Owner - Bulkcarrier	Bond	Sustainability Linked Bond	27,725,891	NIBOR3M +3.65 %	9/5/2028
6/11/2024	Yara International	Oslo Bors	Integrated Cargo / Shipping Group	Bond	n/a	107,199,773	NIBOR3M +0.97 %	6/11/2029
6/11/2024	Yara International	Oslo Bors	Integrated Cargo / Shipping Group	Bond	n/a	83,895,474	4.82 %	6/11/2029
6/11/2024	Yara International	Oslo Bors	Integrated Cargo / Shipping Group	Bond	n/a	65,252,035	5.04 %	6/11/2034
9/25/2024	MPC Container Ships	Oslo Bors	Ship Owner - Container	Bond	Sustainability linked bond	125,000,000	7.375 %	10/9/2029
9/26/2024	CHN Energy		Other	Bond		713,116,745	1.93 %	9/26/2027
11/15/2024	Polaris Renewable		Other	Bond	Senior Secured Green Bond	175,000,000	9.5 %	11/15/2029
11/28/2024	Longyuan Power	Hong Kong Stock Exchange (HKE)	Other	Bond	n/a	344,947,188	2.00 %	11/28/2027

Source: Clarksons Research, 2024; author's compilation

3.4 Green issuances in the maritime industry

One of the key motivations for banks and financial institutions to offer green or sustainable loans is the opportunity to tap into a new investor segment via the capital markets. Green or sustainable bonds, unlike traditional bonds, are tied to specific environmental or sustainability criteria. The issuer commits to using the funds raised for projects that align with these criteria. Consequently, banks and financial institutions may allocate capital exclusively for such projects, which may require independent verification to ensure compliance with the established standards. It is important to note that the European Union is currently working on legislation to define these criteria. If a project fails to meet the specified objectives, and falls outside the agreed criteria, investors may claim that they were misled. As a result, banks and financial institutions will require detailed, ongoing reporting from any project funded by such bonds, and they will implement rigorous standards to maintain compliance with the bond's green or sustainable terms.

Over the past three years (2022-2024), the maritime industry has seen a total of 130 green issuances, encompassing both bonds and loans across major shipping stock exchanges worldwide (see **Table 3**). In 2022, the total value of these green issuances amounted to USD 28.5 billion, which decreased to USD 17.8 billion in 2023, and further declined to USD 10.9 billion in 2024. These issuances include various types, such as green bonds, blue bonds, green hybrid bonds, and sustainability-linked loans. The issuances span across all sectors of the industry, including tankers, bulk carriers, container ships, chemicals, integrated cargo, ports, and shipyards (Clarksons Research, 2024).

4. A way forwards

The transition towards an SOE requires not only a recognition of the challenges, but also strategic and actionable pathways to mitigate risks, mobilize investments, and promote sustainable practices across the maritime industry. Key strategies that stakeholders- governments, financial institutions, and private enterprises- can undertake to foster green finance and secure sustainable maritime practices include establishing a unified regulatory framework. This framework is essential for promoting transparency and credibility in green finance, which should involve creating standardized definitions and benchmarks for what constitutes 'green' in maritime operations, as well as developing performance metrics for assessing the environmental impact of shipping activities. Regulatory incentives for shipping companies that adopt sustainable practices, including tax breaks or subsidies for environmentally-friendly investments, can further enhance compliance.

In addition, promoting innovative financial instruments is crucial for bridging the financing gap in ocean resources and the maritime industry. This involves encouraging the issuance of blue bonds specifically targeted at funding marine conservation projects and sustainable shipping initiatives, facilitated through public-private partnerships to enhance investor confidence and reduce perceived risks. Furthermore, extending the scope and scale of funds akin to the Green Shipping Fund can provide substantial backing for eco-friendly shipping practices and technologies, while developing tailored insurance products can mitigate risks associated with such investments.

Strengthening capacity building and technical assistance is also important in fostering the transition to sustainable practices. This can be achieved through implementing training initiatives for shipowners, operators, and policymakers to raise awareness about sustainable practices and green finance opportunities. Moreover, providing technical support to stakeholders can help them identify suitable green technologies and access financing options. Research and innovation grants should also be funded to develop innovative technologies that enhance operational efficiency and reduce environmental impacts in shipping.

Fostering public-private partnerships is vital for advancing sustainable shipping practices, requiring collaboration between public authorities, private companies, and financial institutions. Creating platforms for dialogue can facilitate knowledge-sharing, and joint investment programs can align resources with sustainability goals. It is also essential to engage local communities to ensure their economic and social concerns are reflected in financing strategies for marine resource management.

Lastly, enhancing data sharing and research on ocean finance and the shipping sector is crucial. Establishing standardized collection mechanisms and comprehensive environmental and social impact assessments for maritime projects funded by green bonds empowers stakeholders to monitor and evaluate outcomes effectively. Furthermore, developing a global accountability framework is necessary to track progress towards sustainability goals in the maritime sector, assessing the effectiveness of financing mechanisms.

5. Conclusions

Advancing an SOE presents both a formidable challenge and a significant opportunity for the maritime industry and global ecosystems at large. This study has underscored the critical importance

of integrating financial mechanisms, regulatory frameworks, and innovative practices to promote environmental sustainability, while enhancing economic resilience, in ocean-dependent sectors. The oceans, which play a pivotal role in sustaining human life and supporting economic activities, face escalating threats from climate change, pollution, and unsustainable resource extraction. Thus, the urgency of establishing a sustainable approach that balances ecological integrity with socio-economic benefits cannot be overstated.

The findings of this study highlight the promise of innovative financing tools, such as blue bonds and the Green Shipping Fund, in mobilizing capital for projects that prioritize ocean health and sustainability. These financial instruments not only augment funding for essential initiatives aimed at marine conservation and sustainable shipping practices, but also facilitate public-private partnerships that can bridge the gap between governmental priorities and private sector investment strategies. However, the success of these instruments hinges on their alignment with clear, standardized definitions of 'green' practices and transparent reporting mechanisms. The development of robust criteria will enable stakeholders to make informed investment decisions while fostering a sense of trust and accountability in financial markets.

Moreover, addressing the significant financing gaps observed within the ocean economy necessitates concerted efforts to create an enabling environment for sustainable investments. Regulatory frameworks that prioritize environmental sustainability, alongside incentives such as tax breaks or grants for adopting sustainable technologies, can enhance the attractiveness of investing in ocean health. Establishing a unified regulatory standard across jurisdictions will not only streamline compliance for shipping companies, but also provide clarity and stability to investors, ultimately leading to larger commitments of private capital towards the blue economy.

Capacity building and technical assistance represent another critical area for fostering the transition to sustainable practices in maritime operations. Stakeholder engagement will ensure that diverse perspectives and local knowledge inform the development and implementation of financing strategies. This participatory approach can enhance the efficacy of marine resource management and promote equitable economic opportunities for coastal populations.

Furthermore, enhancing data collection and research initiatives is vital for understanding the broader economic, environmental, and social impacts of the ocean economy. Standardized data collection mechanisms and comprehensive environmental and social impact assessments will empower stakeholders to monitor and evaluate outcomes effectively, thus driving accountability and enhancing transparency in financed initiatives. A global accountability framework is essential to track and report on the progress toward sustainability goals within the maritime sector, fostering a culture of continuous improvement and adaptive management.

As this study indicates, while economic activities associated with the ocean present significant opportunities for growth and job creation, they also pose substantial risks to marine ecosystems. Thus, the path forward must prioritize the long-term health of ocean resources over short-term economic returns. Stakeholders must recognize that investments made in ocean sustainability pay dividends not only in terms of ecosystem restoration and protection, but also in securing the livelihoods and well-being of millions who depend on these resources.

Ultimately, the collective realization of an SOE requires unwavering commitment and collaboration from all sectors- governments, private institutions, civil society, and local communities. By embracing shared objectives and reinforcing existing partnerships while forging new alliances, we can drive a transformative shift towards a more sustainable and equitable maritime future. This holistic approach will solidify our trajectory towards a world where healthy oceans continue to thrive, supporting both environmental ecosystems and human prosperity for generations to come.

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