



Innovative financing mechanism for blue economy projects

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ABSTRACT

Investments flowing into blue economy projects are estimated to be much lesser than the requirements, for achieving the targets set out in the UN Sustainable Development Goals. Blue economy projects are typically financed through conventional means of public and development finance. However, the nature and characteristics of blue economy projects transcend the need to extend beyond the conventional financing options of multilateral/bilateral aid. The objective of this article is to assess if the existing blue economy initiatives are adequate to the sectoral investment needs and to develop contours of a framework that could accelerate the blue economy investments. The research finds that the current initiatives such as blue bonds are relatively small and accelerating investments requires access to additional financing instruments and a transformative change in participating stakeholders. Using a Theory of Change approach, contours of a framework that pools in low-cost funds from a diverse set of investors to be deployed for either public sector promoted large impact projects or individual blue economy projects through market-based instruments are suggested. The findings contribute to the ongoing debate on how to improve the financial capability of various blue economy stakeholders and enable them to configure more sustainable financing mechanisms.

1. Introduction

Oceans make life possible and support the livelihoods of billions of people. The importance of marine life is emphasized through Sustainable Development Goal 14 that deals with life below water. The concept of sustainable oceans' economy relies on maintaining a balance between ecological and economic imperatives. The blue economy refers to the use of ocean and associated resources sustainably for economic development while protecting the ecosystem, and is defined as "... practical ocean-based economic model using green infrastructure and technologies, innovative financing mechanisms, and proactive institutional arrangements for meeting the twin goals of protecting our oceans and coasts and enhancing their potential contribution to sustainable development, including improving human well-being, and reducing environmental risks and ecological scarcities" [1]. Clean technology and renewable energy sources provide necessary tools for the blue economy to achieve social and economic stability characterized by inclusiveness, stakeholder participation, and transparent and accountable processes [2]. The market value of coastal, marine resources, and related industries is an estimated USD 3 trillion to USD 5 trillion, which is nearly

5% of global GDP [3]. In some East Asian countries, the ocean economy accounts for 15%–20% of GDP [4]. Better management of blue economy assets can enhance productivity, improve operational efficiency, and provide attractive returns for stakeholders. Yet, such an important resource has been misused and improperly managed, causing irreversible negative effects to the environment and marine life in particular, and the livelihoods of many communities along the coastline.

Human activities are impacting the earth's natural landscapes at an alarming pace. The health of oceans, earth's largest natural system, is rapidly deteriorating. Dumping of chemicals and trash generated from land sources into oceans is a significant source of marine pollution [5]. This type of pollution severely impacts the environment, poses adverse health risks to all organisms, and is a threat to economies. Additionally, the oceans are impacted by climate change, environmental pollution, unsustainable fishing, and unregulated coastal development, which present a grave threat to marine life and the productivity of oceans. Nearly 50% of coral reefs were lost in the last three decades and at this pace, it is estimated that about 90% of this unique ecosystem would perish by 2050 [6]. The largest negative impact on marine ecosystems in the last 50 years has been through overfishing and land/sea-use change

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[7]. Besides, eight million tons of plastic enter the ocean annually, mostly from Asia, along with huge volumes of agricultural pollutants and untreated wastewater. Population growth in cities, rising economies in Asia, along with declining fish stocks, pollution, water crisis, and climate change, necessitate an urgent need and incentives for promoting the blue economy.

Human activities on land that result in various forms of pollutants are responsible for almost 80% of marine pollution [2]. Waste in the form of plastics is the biggest threat, followed by sewage, pesticides, industrial chemicals, and other solid waste. China, Indonesia, the Philippines, Thailand, and Vietnam contribute to approximately 60% of the plastic waste entering the oceans [5]. Plastic bags, fishing nets, and other debris that find their way into the sea as waste dump directly affect marine life. These are the cause of unnatural death for a large number of seabirds and sea turtles every year. Through the seafood chain, these constituents enter the food chain and pose serious health hazards when consumed by humans. About two-thirds of marine lives are under threat from the daily use of chemicals, including household cleaners. Nearly half of the total of 120 million tonnes of nitrogen used for crops end up flowing to oceans [8]. Ocean acidification by the shipping industry due to nitrogen oxides and sulfur oxides that are emitted, caused by burning of marine fuels, ballast water, greywater, and other cleaning material is on the rise [9]. The rise in seawater is estimated to be 0.13 inches per annum over the last two decades, which is almost double the rate at which sea level rose in the previous 80 years [10]. Expected consequences of seawater rise are frequent wetland flooding, increased erosion, and farmland contamination and more importantly a serious threat to marine life. The quantum of hazardous waste dumped into water bodies by mining companies every year is estimated to be 220 million tonnes [11].

Many countries have indicated their intention to curtail the ocean pollution, evident through their articulation of nationally determined contributions under the Paris Agreement and the Aichi targets (part of the Convention on Biological Diversity). The conventional funding sources that underpin the commitments include the official development assistance and public budgets [12,13]. Newer sources have emerged in the recent past that includes philanthropic grants [14–16]. The avenues available under green finance are sought to be utilized for funding the blue economy, however, the past trends of green finance indicate that water-related sectors did not manage to raise substantial sums [17].

The financial constraints include a lack of fiscal measures and declining development assistance and funding from private investors through foreign direct investments, in addition to some countries also facing huge burdens of external debt. The other challenges for attracting investments into blue sectors arise from weak enabling frameworks, which include institutional, regulatory, governance, legislative and human resources that are required for establishing strong intersectoral and transboundary partnerships [18].

A survey conducted by Responsible Investor, reached out to 328 institutional investors in 34 countries to assess their interest in financing the ocean economy [19]. The results indicate that nine out of 10 investors are interested in investing in sustainable blue economy projects and a third of the respondents regard the sector to be an important one in 2020. The survey highlights that public pension funds, charitable organizations, wealthy families, and individuals are more interested in blue finance. The reasons cited are positive financial gains in addition to advancing SDG 14 to make a difference to society and the environment. The key sectors identified by investors include climate change mitigation and adaptation through marine renewables, marine plastic pollution, sustainable fisheries, and aquaculture. To reduce the risk in investments, the respondents opined that strengthening enabling conditions and developing innovative finance approaches was a necessity [19].

From the time Robert Costanza estimated the annual value of natural capital [20] there have been numerous attempts at valuing the ocean economy [5,12,15,21–23]. It is estimated that the ocean economy if

treated as a country, would be the 7th largest economy in the world [2]. The contribution of marine fisheries to the global GDP is estimated to be more than US\$270 billion per year [24] and result in benefits of nearly USD 2.5 trillion per annum to humanity [23]. However, the investments that go into managing this precious resource have not kept pace [16].

The approach to developing a blue economy hinges on balancing the twin objectives of economic growth and environmental sustainability. Growing the blue economy provides a unique potential for expanding a range of interdependent sectors and services, predominantly tourism, fisheries, and aquaculture, and ocean renewable energy. This expansion requires access to long-term financing options, that provide the scale and flexibility for different stakeholders.

The trends witnessed in financing and investments in the blue economy have been more significant in coastal and ocean-related sectors, through various blue financing instruments. Limited success was seen in developing new and innovative financing mechanisms to attract financing for other blue economy sectors [12]. For sectors to transition to the blue economy and gain from the potential these sectors have to offer, developing a range of scalable financing instruments is one of the most pressing challenges that countries are facing.

A key challenge that remains includes an assessment of the adequacy of the current blue economy investment products in relation to the investment needs of various stakeholders, and what should be contours of a blue finance mechanism that could accelerate investments from diverse stakeholder groups. Theory of Change (ToC), an approach that is outcome focussed while systematically assessing the context of the system [25], is adopted as a framework for configuring various interventions that are needed to promote increased investments into the blue economy.

Within this context, the research investigates the following questions:

- How do the recent blue investment instruments (in particular, blue bonds) compare with the investment needs of the blue economy?
- What are the contours of a financing mechanism that could be used by developing countries for accelerating blue economy investments?

The article is structured in the following manner. The conceptual framework of the method adopted is set out in Section 2. The current understanding of the blue economy financing landscape is set out in Section 3. Section 4 discusses the inputs, interventions, and imperatives for accelerating the blue investments and Section 5 presents the findings and conclusions.

2. Methodology: theory of change approach to reach intended outcomes

While the blue economy sectors are evidencing increased interest by the impact investor community, the scale and terms of investment are not in tune with the requirements [26]. There is a growing consensus on the outcomes of the blue economy financing landscape, and the stakeholders including the government agencies, development finance institutions, impact investor community is willing to make requisite interventions. The theory of change framework is widely used in impact investing as a steering tool to effectively measure and manage investments that garner positive change [27]. The process starts with the end goal of creating a sustainable impact and details out the steps that translate this intention to specific actions and result areas. ToC involves mapping the steps commencing from the current context to the desired transformation through various changes/initiatives. In essence, ToC comprises an interactive, iterative process used to develop a description of why and how a series of activities can lead the transformation in a particular context. ToC has been utilized across many disciplines including development research and social impact investing. The ToC approach encourages deliberations amongst various stakeholder groups on why certain activities would lead to expected outcomes, thereby

building the confidence of prior initiatives [28]. ToC sets out the path from the initial state to the desired outcomes of a program or a project by setting out the logic, assumptions, influences, and causal linkages.

This research, therefore, adopts the Theory of Change (ToC) to analyze and evaluate economic and development initiatives [25], predominantly from an impact investment perspective. ToC as a concept and process is useful in investigating why and how a certain sequence of activities leads to a specific transformation in a given context. An intervention strategy based on ToC is reflective of a transformative change, from a current suboptimal situation to a more desirable high-performance ambience. In the international development context, it is seen as an outcome-based approach leading from the design, implementation, monitoring, and evaluation of schemes aimed at transforming the current context [27].

ToC typically comprises the following elements: a diagnostic of the current status (including the stakeholders involved who are part of the problem, and who could be the part of the solution), the long term transformation that is desired, series of change activities/events, assumptions for the same and transformation narrative summary (usually depicted as a schematic) [25]. The process of developing the ToC transforming the financing ecosystem for blue economy projects is based on literature review, perusing the summary notes of conferences on green and blue finance, and the program documents on the blue economy by the multilateral and bilateral agencies. The process is depicted in Fig. 1 below.

In the blue economy financing landscape, the current context relates to how the blue economy sectors are structured, the strengths and weaknesses, the motivations of various stakeholders who influence the conduct of the blue economy. There is an increasing consensus on the long term transformation that is desired (more investments and sustainable practices), based on the anticipated external and internal factors affecting the growth of the blue economy [12]. The requirements for such a long term transformation, the actions that would need to be undertaken, and the outputs of such actions which lead to the desired change, need to be based on the way the financing mechanism is likely to evolve for the blue sectors.

In this research, ToC is used ex-ante to systematically generate a picture of transformation through a series of change initiatives (goals and principles). These initiatives can be applied at different levels in the region based on the needs, local context, and exigencies. One of the main constituents for achieving the SDGs is to provide appropriate financing resources. This would involve providing adequate quantum, in a timely

fashion, through appropriate instruments, and at an equitable cost. This vision could be achieved through a series of initiatives to be undertaken over the period. ToC approach can have substantial benefits that match the requirements, expectations, and challenges for achieving the financing needs of blue economy projects. Obtaining robust evidence would further enhance the theoretical understanding needed for achieving this transformation.

3. Diagnosis of blue economy financing landscape

Human actions have been adversely affecting the marine life through a myriad of activities including the discharge of urban pollution, overfishing, habitat destruction [29,30], leading to a severe drop in the ocean health, and consequently impacting the livelihoods of local communities on one end to the global trade and economy at the other extreme [31,32]. The 21st Conference of the Parties of the United Nations Conference on Climate Change included “Ocean” in the Paris Agreement and resulted in subsequent Global Climate Action Agenda. The Paris Agreement mandates the stakeholders to make their best efforts through “Nationally Determined Contributions” in responding to the threat of climate change. The stakeholders need to report periodically on their pollution levels and implementation plans. UNFCCC has a system in place for measuring, transparency, and verification. The Ocean and Climate Initiatives Alliance (OCIA) emphasizes the importance of cooperation and cohesiveness in achieving a greater impact on Ocean and Climate Action. To mitigate the declining ocean health, numerous commitments and initiatives have been taken by nations, within the Rio +20 outcome document, and through their nationally determined contributions. Multilateral and development agencies have also launched initiatives to protect the blue economy including the following ones listed in Table 1 below.

Despite these efforts, the lack of uniformity and alignment in the participating nations is apparent. As part of the Ocean Conference and the nationally determined contributions, nearly 1400 voluntary commitments have been made [12], about 70% of those had marine-related aspects [33]. However, the importance ascribed to SDG 14 is relatively lower [34], while the official development assistance to the marine sector has reduced more than 30% between 2010 and 2015 [35]. The inadequacy of conservation funding is widely prevalent [36] partly due to the reason that the project revenue models for most of the marine conservation projects depend on the monetization of economic rewards and capture of enforcement fees and penalties [37].

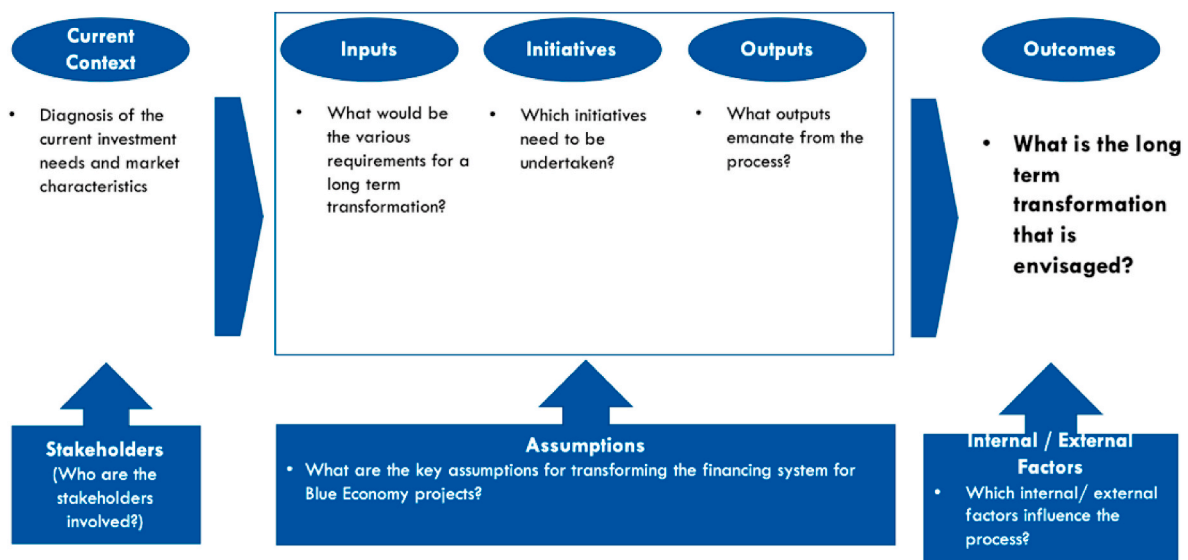


Fig. 1. ToC steps.

Table 1
Initiatives by Multilateral Agencies. Source: Authors Compilation from respective organizations' websites and press releases.

S No.	Entity	Blue Economy Initiative
1	Asian Development Bank (ADB)	ADB announced the "Action Plan for Healthy Oceans and Sustainable Blue Economies for the Asia and Pacific region" in May 2019, indicating a financial and technical assistance of USD 5 billion.
2	The World Bank	The World Bank's Blue Economy Program, PROBLUE was launched in September 2018, to support integrated and sustainable economic development in healthy oceans. This program addresses themes related to ocean pollution prevention, sustainable economic development of marine economy, developing institutional capacities of government and other stakeholders.
3	United Nations Environment Programme (UNEP)	UNEP drafted a "Marine and Coastal Strategy of UN Environment Programme for 2020–2030". The strategy sets out the guiding principles for sustainable ocean actions and emphasizes development of knowledge base relating to marine economy, promote circularity, encourage policies for sustainable utilization of coastal system resources and encourage adoption of innovative financing instruments.
4	United Nations Conference on Trade and Development (UNCTAD)	UNCTAD provides support for policy development, preparation of project pipelines, assist in developing regulation and dissemination of best practices in blue economy sectors.
5	European Union (EU)	The EU proposed a "Blue Growth" strategy in 2012 as a core approach for policies regarding Europe's large water bodies. The Strategy provides framework for cooperation between various stakeholders with the objective of ensuring the sustainability of the marine environment. The report on the "Blue Growth Strategy Toward More Sustainable Growth and Jobs in the Blue Economy" prepared by the EU in 2017, sets out their thrust areas including push for growth in blue energy, aquaculture, coastal and maritime tourism, blue biotechnology, sea bed mineral resources; use data analytics, spatial planning, and maritime surveillance.

The discourse on marine sustainability and urban pollution have been treated separately, though the integration is increasingly visible in the urban settlements [38,39], leading to the development of interrelated project ideas, such as urban runoff and sustainable drainage systems [40].

The estimates for ocean conservation funding are based on the United Nations Convention of Biological Diversity target of 20% of the ocean in the marine protected areas and are estimated to be of the order of USD 4 billion to USD 8 billion per annum [41]. The same was subsequently revised to USD 3 billion to USD 8 billion per annum for 10% of MPA coverage [42]. Under UNFCCC, USD 100 billion per annum by 2020, was committed by developed countries. Of the major funds established namely Least Developed Countries Fund, the Special Climate Change Fund, the Adaptation Fund, and the Green Climate Fund, an estimate by Guggisberg, indicates that only 6% is in marine or coastal initiatives [15].

Conservation of the ocean economy is being funded through a variety of sources, the most common ones being official development assistance

and grants [36]. The funding availability is constrained by many factors including business and revenue uncertainties faced by the investors, legal and regulatory challenges (relating to property rights, policy certainty over the project life) [16]. The gap in conservation funding is quite significant and needs a combination of different sources to bridge the same. While the study by McKinsey estimates the gap in financing to be the order of USD 300 billion [43], various researchers have estimated the same at a much higher magnitude of approximately USD 7 trillion [14,36,44]. The blue economy projects have received a very marginal share of available conventional and green sources [16]. There have been arguments to enhance the share of private capital markets and the adoption of more innovative financial instruments [12]. Bonds specifically for ocean-related activities have been launched in the recent past. The deployment of such funds is sought across a diverse range of marine economy initiatives such as stakeholder capacity building and infrastructure projects [45].

The frameworks available under the Clean Development Mechanism (under the Kyoto Protocol for managing the greenhouse gas emissions) have been sought to fund the blue economy projects. The market for green bonds has been in existence for more than a decade and that provides some cues for the future of blue bonds. The cumulative issuances of green bonds since 2007 are of the order of USD 521 billion. The five largest countries in terms of gross issuances in 2018 are the USA (USD 34 billion), China (USD 31 billion), France (USD 14 billion), Germany (USD 7.6 billion), and Netherlands (USD 7.4 billion). Developed economies with well-developed capital markets have largely been accountable for the majority of green bond issuances. The contribution of emerging and developing economies to green bond issuance has been small. Among those emerging and developing economies who issued green bonds, South Africa led the pack with a share of 0.2% of global issuances. The share of Asia Pacific (excluding China, India, South Korea, and Singapore) is relatively small [17]. Most of the bond finance has been channeled towards energy-efficient conventional technologies and sectors. Recently issued bonds pertain to renewable energy, energy efficiency, and transport sectors. Green bonds targeted for renewable energy have been funding established technologies, such as hydro, wind, and solar, and projects where environmental and emissions characteristics are conventional. In the transport sector, almost 90% of the green bonds outstanding are financing rail infrastructure (primarily in China). The share of finance for energy-efficient vehicles and bus systems has been small [17]. The green bonds market is estimated to reach USD 250 billion in sales by the end of 2019, according to the Climate Bond Initiative, or an almost 50% increase from 2018 [46]. The green bond market is characterized by established systems to ensure that the use of proceeds is tracked and reported; this, however, comes at a significant cost of administration and monitoring, effectively resulting in the deployment of more than 80% of funds in energy efficiency sector. Funding generated from the capital markets is not flowing toward ocean health and conservation efforts. There has been limited use of these funds by other sectors, namely, water, waste, pollution, agriculture, and forestry.

The prominent blue bond that has caught worldwide attention is the one issued by the Republic of Seychelles. As the first sovereign Blue Bond issued in the world, it provided finance for private capital firms to invest in sustainable fisheries management. The bond was issued in February 2016 and originates from a debt buy-back of USD22 million with Paris Club creditors. The size of bond issuance was a nominal amount of USD 15 million with a maturity of 10 years. The World Bank, Global Environment Facility, and International Bank for Reconstruction and Development provided support of USD 20 million finance package, 5 million loan and a USD 5 million grant respectively to the bond to conserve its marine ecosystem and promote the value chain of the seafood industry. Additionally, IBRD provided a guarantee of EUR 5 million and GEF provided a credit of USD 5 million as a Non-Grant Instrument. These credit enhancement mechanisms were intended to reduce risk to investors, increased credit rating thereby lowering the interest rate to

between 2% and 3%. The blue bond will provide grants and loans. Grants are meant for fisheries management planning activities and loans are meant to channelize local public and private investment in sustainable fishing management activities. The disbursement of blue bond proceeds will be through the Seychelles Conservation and Climate Adaptation Trust and the Development Bank of Seychelles [47].

In 2019, Nordic Investment Bank issued its first Nordic-Baltic Blue Bond with SEB bank as the lead manager. The 5-year USD 213 million bond is focused on financing projects in water pollution prevention, wastewater treatment, and water-related climate change adaptation. The bond offering 0.375% coupon was oversubscribed more than two times. The details of these initiatives are set out in Table 2 below:

There has been increased activity of launching blue -economy themed impact funds that are focussed on marine and coastal based industries. The features of a few of the funds are as set out in Table 3 below:

While the announced initiatives have a large initiative size, all the initiatives that have been launched have a typical size under USD 50 million, with an investment horizon of about 10 years. The deal sizes of each project are expected to be an average of USD 2 million. The return expectations are typically commercial with the targeted projects in fisheries and circular economy. It is expected that the final beneficiary of most of these funds is a private sector developer. The funds are highly assisted/structured products, which makes replicability a concern. The funds while expected to benefit the direct users might fall short on the impact on the environment given these features and large investments needed.

Blue bonds on their own will not be able to scale blue finance in the coming years. Public sector involvement in conservation would still be necessary. Blue bonds would, however, support certain projects under some market conditions.

The diagnosis of the current context indicates that there is a huge requirement of funds to achieve the targets sets out under SDG 14, there is not enough information on the project pipelines across the globe that point towards an approach for tackling ocean pollution prevention, the funding continues to be with conventional sources including the government sources with multilateral/bilateral assistance, and with a large section of investors staying out of the blue economy investments. The initiatives that have been launched, though are very welcome, appear to be insufficient to address the gap. There is a need for mechanisms that would accelerate the investments required in the blue economy.

The stakeholders in the financing landscape of the blue economy are largely the governments and their agencies, development finance institutions, who traditionally have been providing necessary funds, policy, and institutional support. The needs, following from commitments to sustainable practices including SDG 14, have meant that their sources of funding are not adequate, and would need diversification to attract private sector and philanthropic sources. Though the private sector interest has increased, the participation is not mainstreamed as yet in

Table 2
Blue bond initiatives.

Bond	Objective	Size/ Duration	Investors	Key Terms
Seychelles Blue Bond	Transition support to sustainable fisheries	USD 15mn; 10 years	World Bank; Private Placement: Calvert Impact Capital; Nuveen, and Prudential Capital Market	The loan provided by GEF reduced interest rate for the government from 6.5% to 2.8% 0.375% coupon
Nordic-Baltic Blue Bond	Targeted towards water resource management and protection	USD 213mn; 5yrs		

Source: Authors' compilation

relation to the requirements. The countries do not have adequate project pipelines to provide a regular stream of investment opportunities to the investors. The significant extent of discourse is from the non-government sector (often representing the beneficiaries), policy, and academic think tanks, who do not have a substantial financial stake in the blue economy.

4. Inputs, interventions, and outcomes

Various investment approaches and opportunities that are available (i.e., multilateral/bilateral sources, market-based approach, incentives, regulations, etc.) need to be dovetailed for a cohesive development framework of the blue economy [12]. The challenges faced for upscaling ocean economy investments include the lack of consistent source of concessional finance, limited capacity of the implementing authorities (to develop project pipelines and subsequently develop and implement in projects), bankability concerns of the blue sector projects and nascent customized instruments.

The blue economy assessment is focused on the economic perspective of the ocean economy and the natural oceanic capital while meeting the goals of healthy oceans and a more inclusive, sustainable development. The financing strategy needs to be in tandem with the sub-sector characteristics influencing the choice of instruments and structures. The following Table 4 indicates the revenue models prevalent in blue economy sectors:

Most environmental sectors need public funding support for construction and O&M of infrastructure. The limited fiscal constraints of local authorities, the public sector proponents, and the private sector underscore the need for sustainable, long-term concessional and innovative financing structures [48,49]. There is a need to provide a substantial quantum of concessional finance across the spectrum of blue sectors to get the projects off the ground. While the projects that have sizeable revenue potential, would find the support of private investment, the challenge would be those projects that have large economic benefits but very limited existing cash flow streams. These projects also tend to be those with large impacts on the environment, usually promoted by the public sector. Assured access to concessional finance, particularly those regions (in Asia for instance), would significantly assist the launch and implementation of ocean conservation projects. The recent initiatives such as the ASEAN Catalytic Green Finance Facility have been able to substantially lower the cost of funds (below those offered by official development assistance). Similar bouquet of stakeholders, along with philanthropy sources can provide a sustainable source of low-cost funds for ocean finance. The funds can then be used to provide capital expenditure and operations and maintenance related expenses and could be used to underwrite or guarantee the issuance of bonds by the project entities.

Generating a healthy pipeline of blue economy projects is one of the most significant challenges that remain to be addressed [50]. Specifically, progress has been slow on building a pipeline of projects that: (i) support a country's sustainable development goals while also being (ii) well-structured and (iii) bankable (or having the potential to be bankable). Scaling up conservation and development efforts will be challenging in the absence of addressing the pipeline challenge. Much of this work needs to happen at a national level and will be a critical part of creating the systematic "transformation" required to fully realize a sustainable blue economy. Establishing routine processes in project evaluation is a way to increase efficiency in the selection process. A good due-diligence checklist is required to assist fund managers to identify credible projects early. Project templates will assist in the development and structuring of projects and help investors avoid risky projects.

The bankability of a project to investors and lenders is generally defined as one that generates sufficient cash flows to meet obligations created during the outlay of capital. Also, investors are looking for a project with a predictable revenue stream. Investors and lenders are often faced with a challenge of not enough bankable and investment-

Table 3
Recent blue economy related fund activity.

Fund	Objective	Size/Duration	Investors	Key Terms
RARE's Meloy Fund	Incentivize the development and adoption of sustainable fisheries	USD 22Mn; 10–12 projects in 10 years	GEF; FMO (Dutch Development Bank); Impact Investors; the Jeremy and Hannelore Grantham Environmental Trust; Bloomberg Philanthropies; JPMorgan Chase	Equity and Debt; Looking at effective IRR of near 6%; debt at 10%.
Encourage Capital	Investing for sustaining global fisheries	USD 100Mn (hypothetical assumptions) across 6 blueprints	Private investors; grant foundations; multilaterals	5–35% equity returns; around 10 years
Althelia's Sustainable Ocean Fund (SOF)	Making available growth capital for harnessing the ocean's natural capital	USD 100Mn across 10–15 investments	Conservation International; Environmental Defense Fund	Duration of 8–10 years with an annual coupon
Circulate Capital	Protecting South & Southeast Asia from plastic waste	Aim USD 5Bn <ul style="list-style-type: none"> • USD100mn equity commitments from private corporations • USD35mn guarantee secured from USAID 	Coca-Cola; Dow; Danone; PepsiCo, Procter & Gamble;; Unilever	Unlock USD 5.5 bn in private financing

Source: Authors' compilation.

Table 4
Features of blue economy sectors.

Sector	Features	Revenue Model
Fisheries and Aquaculture	Mostly private initiatives – with many small and a few large players – across geographies	Sale of processed/unprocessed produce. Incentives needed for sustainable fishing
Coastal and Marine Tourism	Cruises, hotels/resorts	User Charges/fees
Water Supply	Public Control	Not financially free standing. User fees cover a portion of costs. Significant funding support needed.
Environmental Protection	Public control Wastewater treatment Water Body Cleaning	Not financially free standing. The user fee only in FSM covers costs partially.
Shipbuilding	Private Sector	Manufacturing, services
Ecosystem Conservation (Mangrove, coral reef)	Public Sector	Economic benefits, avoided costs, blue carbon financing, conservation financing
Chemical/Pharmaceuticals	Private sector	Sale of products
Ports and Shipping	Public/private sector	Sale of products/services
Offshore Oil and Gas	Private Sector	Sale of produce – usually policy support only
Energy (marine renewable + Coastal wind/solar/tidal)	Private Sector	Sale of power – incentives for the feed-in tariff

Source: Authors.

ready projects. Banks will be reluctant to finance such projects unless they are satisfied with the risk that they would be assuming by financing these projects. A credit enhancement mechanism could reduce the financial risk for banks, but it adds to the total cost of the project. Marsh and McLennan estimate that around 60% of infrastructure projects in emerging markets in Asia are not 'bankable' without support from public sources [51]. The scarcity of blue investments can mean that it is challenging to accumulate a portfolio of commercially viable blue assets.

A key challenge encountered by conservation finance is the lack of clear definitions and project selection criteria. Issuers and investors seek clear blue investment guidelines. In the absence of well-defined principles and a framework for "blue economy investing", investors will shy away from investing in this sector. The confidence of investors in the performance of their investments usually improves when the underlying features of the instruments namely transparent reporting, the system of independent verification are present [52]. Common standards coordinated and enforced by national and international bodies are critical to guiding investors to understand blue economy investing. In 2018, One of

the initial frameworks for the sustainable blue economy is launched through a collaborative initiative of The European Commission, European Investment Bank, World Resources Institute, and World Wide Fund for Nature. The principles aim to promote the implementation and achievement of SDG 14 (life below water) and ensure that ocean-related investment delivers long-term value without negatively impacting marine ecosystems, carbon emission reductions, or the livelihoods of people who depend on the oceans and their resources[2]. However, much needs to be done to further develop and refine the framework to accelerate investments.

Fig. 2 below summarizes the elements that constitute the ToC for accelerating the blue economy investments.

The ToC process analyses the gaps in the existing financing landscape and establishes the need for a framework to accelerate blue economy investments that can accelerate the implementation of projects. The process of progressing from the current low investment, minimal participation by various stakeholders to the desired outcome of accelerated investments, and quicker implementation of projects would entail a series of actions by the stakeholders concerned, including the policymakers, administrators, investors, beneficiaries, and community groups.

The inputs required for the process of blue economy transformation include the development of project pipelines, having adequate capacity to implement the same, and generating a financing plan for sustainable project performance. generation of project investment roadmaps for achieving the commitments made by the respective governments. These roadmaps need to align with sustainable practices and with national SDG targets. The capacity of stakeholders needs to be substantially improved to configure various elements of the projects and to implement the projects in close collaboration with other stakeholders. While the technical, institutional, and governance elements need to be addressed, a clear financing plan that sets out the investments required, and the instruments likely to be deployed need to be developed. These instruments would need to reflect the revenue models of subsectors of the blue economy.

The project pipeline preparation would need to supported appropriate studies and investigations that would provide the necessary basis. These would also feed into the financing structures that are proposed to be developed. Requisite training and outreach programs need to be configured to build the capacity of the stakeholders concerned. The capacity building of the stakeholder groups is complemented by fostering engagement of the political and community members. The result of these initiatives is a set of objectives, tangible outputs that could be acted upon – a bankable project pipeline, enhanced capacity of the public, private and community stakeholders, and a generation of a bouquet of financial instruments that could be used as appropriate.

The transformation process needs to be premised on the

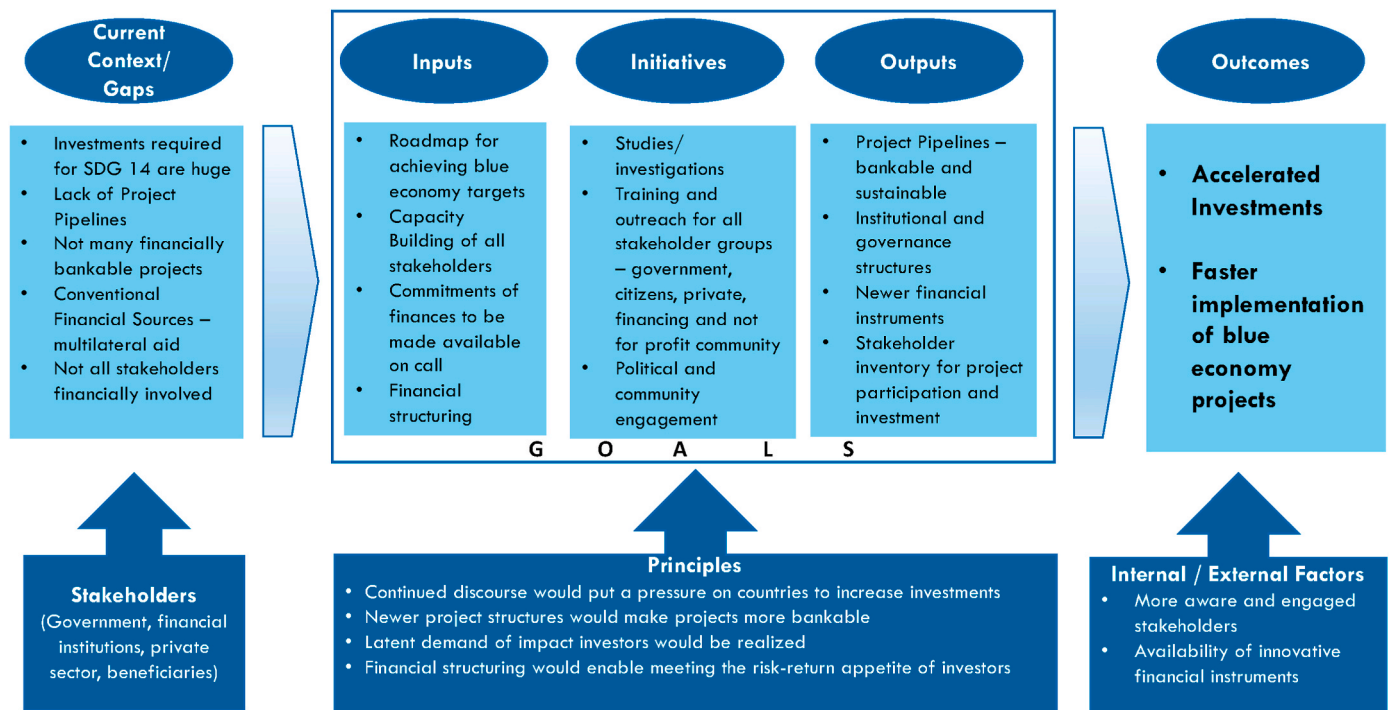


Fig. 2. ToC constituents for accelerating blue economy investments. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

transparency of activities, being open to considering newer project structures, proactive engagement with impact investors, and adoption of financial structures that match the risk-return appetite of the investors intending to participate in the process. The process would need to address the internal and external factors that affect the outcomes including awareness and continued engagement of the stakeholders, and market availability of the financial instruments configured.

The ToC approach as depicted in Fig. 2 provides a context of the current state of blue economy financing landscape, sets out a big picture transformation that is desired to be achieved by various stakeholders,

inputs, interventions, and outcomes, and the assumptions for the transformation as intermediate process activities [25]. A synthesis of these elements is presented as a framework that proposes pathways for accelerating the investments in the blue economy. This mechanism is set out in Fig. 3 below.

The acceleration of blue economy investments are centered around a financing facility (termed as Ocean Financing Facility) that can act as an anchor for raising the required sources of funds, and to direct the same to the blue economy projects as required. This financing facility (with an appropriate institutional structure) could be established at a national or

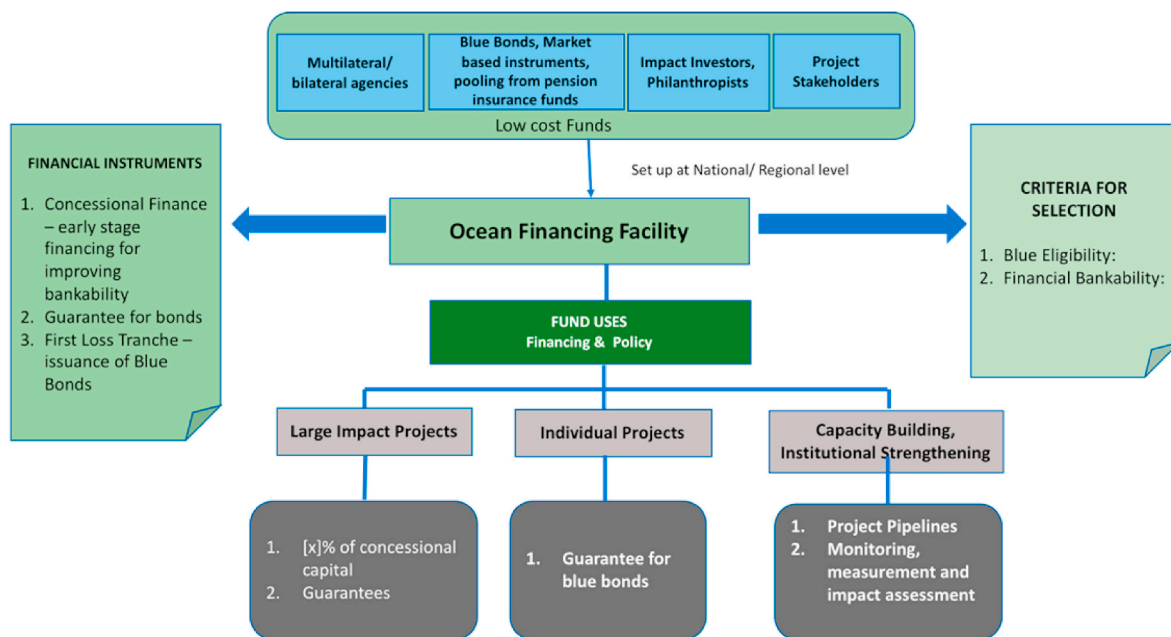


Fig. 3. Framework for accelerating blue economy investments. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

regional center and should be so organized to blend national, multilateral, impact investment, and philanthropic funds. The diversification of the funding sources (category of investors) needs to be so managed to obtain the as low cost of funds as possible. Assistance from multilateral agencies and philanthropic investors could be leveraged with investments from impact investors to raise a larger pool of funds. Financing structures as (blue) bonds and other market-based instruments can provide different tenors of funds as required for the diverse nature of blue economy sectors.

The low cost of funds provided by the investor group is contingent upon the funds being deployed for the projects that enable achievement of blue economy principles, similar to the practices observed in green sector projects. The projects that are eligible to attract funds from the investors need to follow the green principles developed by various agencies as International Capital Market Association or country-specific guidelines as issued by Indonesia, China, or India. Similarly, the blue economy principles are being developed by various international organizations such as the World Wide Fund, United Nations Environment Programme and the United Nations Development Programme. These principles relate to the association and impact of the sector or project on the blue economy. Blue Eligibility refers to projects that adhere to such principles. The investor groups also expect the projects to adequate bankability, usually maintain a minimum debt service coverage ratio, with or without credit enhancement. The pool of resources raised from the investor groups can be made available to eligible projects (generated from a project pipeline and meeting the “blue” criteria and the bankability assumptions).

A range of financial instruments that provide the credit to the blue sector projects could be developed including concessional loans (with varying structures of interest and payment), credit guarantee mechanisms, and first loss tranches. These markets based instruments could be configured for different projects based on their respective investment, cash flow, and risk profiles.

The facility can use the funds through two pathways. First, the large impact projects that the public sector proponents configure, which typically have very little revenue base, but have a significant environment, economic benefits. The facility can assist in raising concessional finance and provide guarantees for repayment of loans/monies raised for undertaking these projects. The facility can also substantially improve the financial outlook (by providing guarantees and participating through subscription to first loss tranches) and can attract a range of project stakeholders. The second pathway would be to provide credit enhancement support to the initiatives of the private sector (typically blue bonds) by providing credit enhancement through guarantees. Simultaneous capacity building and institutional strengthening of the proponents will foster healthy dialogue and could lead to a monitoring and feedback mechanism for continuous improvement of the system.

5. Findings and conclusions

The objective of the research is to assess if the current blue market instruments are adequate to meet the investment needs of the blue economy sector, and what could be the contours of a financing mechanism that can accelerate investments into the blue economy sectors. With the billions of dollars investment to support a sustainable healthy oceans economy, the blue instruments that have been announced are relatively small in comparison and are not capable of addressing the magnitude of financing needs [12]. The financing mechanism that could accelerate the investments could be in the form of a financing facility (with appropriate institutional structure) set up at a national or a regional level. The facility could pool in low-cost funds from a diverse pool of investors and can support projects that meet blue principles (to ensure that the use of proceeds is as stated) and the bankability criteria of investors [50]. The facility can extend financial support to either large impact projects (typically configured by public sector agencies) or individual projects through a variety of market instruments that meet

the project-specific requirements.

Establishing collaborations between stakeholders and getting influencers from the government to be at the forefront can help in developing a strong project pipeline in the blue economy. Private sector involvement in the blue economy is essential – from research to design, deployment, operation, and financing. The public and private partnership is important to move the blue economy forward. However, enabling conditions have to be put in place to ensure viability, and make such partnerships work [50]. The private sector is motivated largely by the enhanced profits generated for its stakeholders in relation to the risks they assume, which the blue economy sectors have failed to demonstrate to date. The role of development organizations (multilateral development banks in particular) becomes important in this context to set out frameworks, financial structures, encourage partnerships with all market stakeholders to shares risks and develop pockets for incubating projects that could be mainstreamed. Blended finance vehicles have a role to play, but more innovative structures like blue bonds, social impact bonds, as well as projects to tap regional capital markets need to be explored [53].

The appetite of institutional investors to assume risks in relation to the returns generated is not currently met by the blue economy projects in the current market [50]. Newer sources or financing or the structuring of assistance that promotes a steady flow of capital (and recurring operating expenditure), at attractive rates (blended with cheaper funding or philanthropic monies), setting out appropriate risk management to improving credit is required. This mechanism can include investors from foundations, multilateral development banks, impact investors, commercial investors, and governments. Such types of arrangements can distribute risk amongst the stakeholders and mobilize the needed private capital that would otherwise stay on the sidelines [54].

The various project phases will require different blending approaches. The typical project life cycle stages, as applied to blue economy sector projects, provide pointers for the type of financing support that is needed. The construction phase needs cheaper low-cost long term financing (with partial risk guarantees, first loss protection for a defined portion of assets), which then can be optimized with take-out financing instruments once the “risky” period has been completed. This would mean demarcating instruments based on the phase of the project and the underlying characteristics. The approach for accelerating the finance for the blue economy sector needs appropriate segmentation and targeting of investors and the respective financing instruments. Education, public awareness, and capacity development are crucial to have behavior change or lasting transformational change and the governance needed in the blue economy.

This research invites attention from government agencies, development finance institutions, and private investors to the challenges faced while considering investments in the blue economy sectors. The findings of this research provide contours of a financing framework that can optimize public and private capital for bridging the financing gap and strengthening the transition to a sustainable blue economy. The findings provide inputs to the government agencies to align the development of their SDG projects to the blue economy principles and suggest broad elements of a financing facility that they can set up to accelerate blue economy projects. The nature of the blue economy projects and characteristics of the same would mean that the development financing institutions could expect substantial credit enhancement support and different instruments that provide concessional financing. The structure of the facility, specific instruments designed, and credit enhancement offered provide a basis for private investors to assess their interest in participating in blue economy sector. These discussions contribute to the ongoing debate on how to improve the financial capability of various blue economy stakeholders and enable them to configure more sustainable financing mechanisms. The research is limited by the small number of initiatives (particularly relating to the issue of blue bonds) that have been undertaken so far. Further research into different blue economy sub-sectors and markets, the appetite of impact investors to

look at geographies with significant blue economies, and institutional governance mechanisms will contribute to the acceleration of investments and quicker achievement of SDG.

CRedit authorship contribution statement

Raghu Dharmapuri Tirumala: Conceptualization, Methodology, Data curation, Writing - original draft, Visualization. **Piyush Tiwari:** Supervision, Validation, Writing - review & editing.

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Appendix A. Supplementary data

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