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BLUE FINANCE: OPPORTUNITIES FOR THE BLUE ECONOMY

Mariana Graciosa Pereira [1]
Jorge Madeira Nogueira [2]

ABSTRACT

The basic characteristics and limitations of different types of Blue Finance are analyzed in this paper. Ocean-based productive activities make a fundamental contribution to the global economy. They are an economic pillar of many countries. These activities - fishing, aquaculture, maritime transport, coastal and marine tourism, exploration and production of oil and gas, among others – have, however, negative effects on coastal and marine ecosystems. Thus, it has become necessary to look through a different focus these economic activities. The Blue Economy represents this new approach. It contemplates the carrying out of economic activities based upon the oceans in a sustainable way, ensuring economic efficiency, with social inclusion and the maintenance of the health of the coastal and marine ecosystems. Nevertheless, the transition to the Blue Economy requires funding contributions, included into the Blue Finance. Under this perspective, different actions in sectors of the ocean-based economy require investments. They will vary from alternatives primarily aimed at environmental and social outcomes to those directed to an environmental performance combined with financial returns. In order to guide the allocation of resources under the Blue Finance, a series of principles have been developed to motivate investors to support projects suitable for a Blue Economy perspective. However, there is a limited number of studies evaluating these principles and actual experiments of Blue Finance. This paper contributes to reduce this gap in current knowledge, highlighting potentiality and constraints of alternatives financial instruments. Our analysis shows that we still have a long journey towards the establishment of a solid Blue Finance arrangement towards a sustainable use of our oceans.
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[1] Brazilian Institute for the Environment and Renewable Natural Resources (IBAMA). E-mail: mariana.graciosa@gmail.com / ORCID: http://orcid.org/0000-0002-7265-8771

[2] Professor of Environmental Economics in the Department of Economics at the University of Brasilia. E-mail: jmn0702@gmail.com / ORCID: http://orcid.org/0000-0002-3772-7145

INTRODUCTION

Ocean-related economic activities have grown in importance around the world. These activities include fishing, marine aquaculture, tourism, transport and port-related activities, exploration and production of oil and gas, mining, among others. They generate US$ 1.5 trillion annually, value equivalent to the gross national product of Russia, and are responsible for 31 million of direct jobs globally (OECD, 2016). Simultaneously, oceans face unprecedented risks due to emerging global threats, especially pollution, overexploitation and climate change.

These risks are of concern as the fulfillment of economic activities depends upon ecosystem services provided by coastal and marine habitats. Services provision (e.g. supply of fish), regulation services (e.g. coast protection), cultural services (e.g. recreation) and supporting services (e.g. maintenance of biodiversity and genetic resources) are needed to enable all economic activities related to the oceans (DE GROOT et al., 2002; LAU, 2013; LILLEBØ et. al, 2017; MEA, 2005).

In this context, it has become essential to search for mechanisms to reduce the negative environmental consequences of consumption and production activities upon marine and coastal habitats. These mechanisms must create the lowest possible loss of economic efficiency, the maximum positive social effects and the minimum environmental negative consequences upon those ecosystems. As a general concept, the Blue Economy concept emerges as "sustainable use of ocean resources for economic growth, improved livelihoods, employment and ocean ecosystem health" (WB and UN-DESA, 2017). The OPRI (2019) indicates that the Blue Economy concept has risen international attention as a political tool to revitalize the economy and promote collective growth of local communities, preserving the ocean environment and its related resources.

The Blue Economy (also referred as sustainable ocean economy or sustainable blue economy) contemplates the recognition of economic activities in the oceans based upon sustainable fashion with economic efficiency, social inclusion and maintenance of healthy coastal and marine ecosystems. It provides social and economic benefits for current and future generations and sustains the environmental quality of the oceans. The economic activity is in balance the long-term capacity of ocean ecosystems to support this activity and remain resilient and healthy, which is not

necessarily reflected in all ocean activities (KEEN et al., 2018; KRONFELD -GOHARANI, 2018; The Economist Intelligence Unit, 2020; UNEP, 2020; WB and UNDESA, 2017).

The transition to the Blue Economy, with the adoption of sustainable practices, requires innovative procedures of activities already consolidated to reduce their environmental negative effects. In addition, it also requires the development and adoption of new, and less environmentally aggressive, economic activities.

In promoting the Blue Economy, consequently, there is a great need to establish adequate financial mechanisms that ensure the steady inflow of financial resources while attracting new investments. These financial resources must be applied in such a way that there are no setbacks in terms of environmental, social and economic sustainability. There is, therefore, a need for Blue Finance mechanisms as essential elements to support and promote this transformation in the pursuit of economic growth aligned with the sustainability of the oceans.

Blue finance can be defined as the finance and investments for the Blue Economy, including financial activities (i.e.: investment, insurance, banking) in, or in support of, the development of blue economy (UNEP, 2020). These funding initiatives include support for projects that aim to reduce carbon emissions and pollution, enhance energy efficiency, establishment of policies for the sustainable use of marine resources and protection of coastal and marine ecosystems (TIRUMALA & TIWARI, 2021; UNEP, 2020).

Blue Finance has risen great attention of scholars for the last five years or so. There is a growing body of research and reports highlighting the potential for funding sustainable ocean activities. Shiiba *et al*. (2021) point out that most of them have assessed financing development efforts dedicated to marine conservation, both on a global and regional scale. Other studies discuss financial challenges focusing on specific aspects, such as marine conservation, fisheries and coastal infrastructure. Blue Finance encompasses, therefore, different types of financing strategies aiming to encourage and support the transition to a Blue Economy. Surprisingly there is no single study comparing potentiality and constraints of alternatives financial instruments of Blue Finance.

This paper feels this gap, presenting and analyzing the principles that guide the financing of a Blue Economy from an economic perspective. In so doing we highlight different available models of funding. We also

emphasize potential areas for application of these resources. Our basic methodological procedure is a critical review of the technical and scientific references published in the last five years. We do not claim that we cover all references, but we scrutinize key studies and reports in the following pages.

Three central section make up this paper. The first section presents the principles that help guide investors interested in supporting sustainability actions within the scope of oceanic economic activities. The second section introduces the potential areas for receiving funds. Finally, the last section assesses the available financing modalities, their constraints and potentialities. As Final Comments, we highlights the consequences of our analyses of Blue Finance to emerging countries that have oceans as a source of employment and income.

PRINCIPLES FOR THE BLUE FINANCE

The technical and academic literature that we analyze is this section recognizes the essentiality of increased funding and investment in the Blue Economy. Moreover, these financial resources must be applied in such a way that there are no setbacks in terms of environmental, social and economic sustainability. Due to these concerns, voluntary principles have been established to guide lenders and investors in applying these resources. A document prepared by the European Investment Bank, the European Union, the WWF and the World Resources Institute highlights essential principles to guide decision to direct investments to leverage the Blue Economy (EUROPEAN COMMISSION *et al*., 2018).

These principles are incorporated into the United Nations Finance Initiative of the Organization's Environment Program (see details in https://www.unepfi.org/blue-finance/the-principles/). They aim to build an international coalition of investors through their adoption on a voluntary basis in their investment decisions. Table 1 presents a summary of the fourteen principles of Sustainable Funding for Blue Economy. They include guidelines on the observance of environmental legal standards and the risks of possible environmental and social consequences. They also include recommendations for guiding investments on projects to ensure social inclusion and innovative solutions to activities in the marine environment. Relevant characteristics of these principles are the appeal to disclosure and sharing of information and cooperation and

establishment of partnerships among investors, as well as their high degree of generalization.

Table 1: Synthesis of Sustainable Financing Principles for the Blue Economy

a.	Adoption of measures to ensure the protection, restoration and maintenance of ecosystem services of marine ecosystems.
b.	Adaptation to international, regional and national legal standards regarding sustainable development and ocean health.
c.	Observation regarding the risks and possible environmental and social impacts (one-off and cumulative) associated with financed activities, evaluated on a scientific basis.
d.	Inclusion and support for local communities and effective engagement with stakeholders.
e.	Cooperation among investors on information sharing including best practices and lessons learned.
f.	Transparency in the disclosure of information about investments made, including environmental, social and economic impacts.
g.	To favor of partnerships between the public, private and non-governmental organizations in order to accelerate the transition to the blue economy.
h.	Develop knowledge and data collection on potential risks and impacts associated with investments and encourage the sharing of scientific information and data on the marine environment.
i.	Prioritization projects and activities that contribute to achieving Sustainable Development Goal 14 (SDG 14) and other SDGs that contribute to good governance of the oceans.
j.	Support for projects and activities that bring short and long term social, economic and environmental benefits.
k.	Diversify investment instruments in order to reach a wide spectrum of sustainable development projects, including small and large-scale projects.

l.	Support investments that result in innovative business solutions that have a positive impact on marine ecosystems.

Source: Own elaboration based on the United Nations Finance Initiative of the Organization's Environment Program (https://www.unepfi.org/blue-finance/the-principles/)

In addition to the above mentioned Sustainable Financing Principles for the Blue Economy, specific principles have also been stablished to guide investment in different sectors of ocean-based productive activities. They include the "Principles for Investment in Sustainable Wild-Caught Fisheries" (see http://www.fisheriesprinciples.org/) and the "Principles of Poseidon" (see https://www.poseidonprinciples.org/) for the alignment of the shipping financing to policies related to climate change.

The "Principles for Investment in Sustainable Wild-Caught Fisheries" are designed to be adopted voluntarily by investment funds and other providers of financial resources to sustainable fishing projects. Investors shall observe the following premises:

1. Adaptation of the project to local, national and international fisheries legislation;

2. Assessment of the environmental status of the fishery resources to be exploited;

3. Evaluate if the project will contribute to sustainable management of fishery resources and their ecosystems;

4. Monitoring of project results to be financed, checking for the impacts;

5. Allow fish traceability and transparency in terms of its origin and sustainability;

6. Guarantee the rights of local communities affected by the financed project;

7. Engagement of local communities;

8. Not restricting the access of local communities to the natural resources on which they depend upon; and

9. Not affecting the food security and livelihoods of local communities. (ENVIRONMENTAL DEFENSE FUND *et al*., 2018)

The "Principles of Poseidon" were drawn up in 2019. Their goal is to align the maritime industry financing portfolios to the sustainability of the sector, especially in adaptation to climate agenda. In this sense, the primary focus is on reducing the emission of greenhouse gases (especially carbon dioxide). Nevertheless, accountability, transparency and correct

application of the metrics established by the Poseidon Principles are also binding to its signatories. According to the Annual Report 2020, the Principles of Poseidon have thirty signatories, including twenty-seven banks responsible for US$ 185 billion in financing to the maritime industry (POSEIDON PRINCIPLES, 2020).

The establishment of guiding principles for directing funding initiatives can be an important step into two directions. On the one hand, in order to attract more investors who want to align their portfolios with ocean sustainability. On the other hand, these principles are intended to avoid harmful effects both to economic activities and to marine ecosystems, such as those that have occurred with some subsidies to the fishing industry as analyzed by Arthur *et al*., 2019). These perverse subsidies led to an increase in catching capacity, resulting in overfishing and reduction of fish stocks. Nevertheless, those guiding principles analyzed above have a high level of generalization, demanding further research to arrive at an operational level. Furthermore, they generate potential conflicts between profitable and efficient financial options and sustainability wishes.

INVESTMENT OPPORTUNITIES FOR BLUE FINANCE

The investment needed to boost the Blue Economy may be directed to different sectors. More relevant than select a sector it is to elect how a sector will develop its activities in a sustainable (economic, social and environmental) way. This investment should ideally reduce the negative externalities generated by ocean productive activities, boost emerging ones and ensure the maintenance of ecosystem services, upon which those productive activities are dependent. Regarding already established activities - maritime transport, fishing, aquaculture, tourism and oil and gas - the focus is to redirect capital towards the establishment of practices that reduce their negative consequences upon marine ecosystems (OCEAN FOX ADVISORY & FRIENDS OF THE OCEAN SECRETARIAT, 2020; THE ECONOMIST GROUP, 2020).

Table 2 summarizes investment opportunities in the different sectors that will contribute to a Blue Economy. These are examples that are already in progress. It seems evident that a handful of alternatives exist to attract Blue Finance opportunities for financing sustainable ocean activities. However, Tirumala and Tiwari (2021) point out that it is estimated that investments in projects of Blue Economy fall short of the

level needed to achieve the goals set in the Sustainable Development Goals (ODS/2030) of the United Nations.

It is noteworthy that one of the main investment demands, among the opportunities listed in Table 2, is the decarbonization process of the merchant maritime fleet and of oil and gas exploration and productive activities, as an alternative to reduce impacts resulting from climate change. In 2018, the IMO agreed to a 50% absolute cut in carbon emissions from ships by 2050 compared to 2008 levels (THE ECONOMIST GROUP, 2020). Strategies for reducing emissions in shipping include improving operational and energy efficiency and improving ship design. However, the main strategy is to change the type of fuel currently used by ships (crude oil) to alternative fuels such as ammonia, liquefied natural gas, biofuel or electricity. This strategy represents 87% of the investments required for the decarbonization of maritime transport (CARLO *et al*., 2020; ENERGY TRANSITIONS COMISSION, 2018).

As far as the fishing industry is concerned, investment opportunities that contribute to a Blue Economy include technologies for: (i) remote monitoring and surveillance for the control and prevention of illegal irregular and not reported fishing; (ii) reduction of accidental capture; and (iii) shipped and post-harvest to reduce food waste. The need to increase the integration of "big data" technologies for monitoring and tracking of vessels is also highlighted (OCEAN FOX ADVISORY & FRIENDS OF THE OCEAN SECRETARIAT, 2020).

In the area of aquaculture, new investments seek to improve sustainable aquaculture practices. Specifically with regard to aquaculture production systems, which are primarily responsible for environmental effects of the aquaculture industry, financing can assist in the transition from using traditional techniques to environmentally less harmful systems, such as: water systems recirculation ("recirculating aquaculture systems" - RAS); systems of offshore aquaculture; and expansion of coastal bivalve and seaweed production. The advantages attributed to these systems include: improvements in feed conversion rate; greater disease control; reduction of genetic interactions with native species and improvement of water quality (O'SHEA *et al*., 2019).

Table 2: Possible investment focus areas for Blue Finance

Sector	Investiment Focus
Maritime Transport	Fleet decarbonization.
Fishing	Fleet tracking technology; solutions to reduce accidental fishing; alternatives for reducing food waste.
Aquaculture	Transition to environmentally less harmful production systems and offshore aquaculture
Oil and Gas Exploration and Production	Decommissioning of production platforms Decarbonization of productive activities
Coastal and Marine Tourism	Transition to ecotourism.
Marine Biotechnology	Expansion of research and development of sustainable products.
Renewable Ocean Energy	Expansion of investment in offshore wind energy; expansion of research and development of other forms of ocean energy such as tidal and wave generation.
Ecosystem Services	Protection and restoration of marine and coastal ecosystems.

Source: Own elaboration based on Ocean Fox Advisory & Friends of the Ocean Secretariat (2020); O'Shea et al. (2019) and Lloyd-Evans (2014).

In the oil and gas exploration and production sector, investments will be required for the correct decommissioning of oil and gas production platforms (VAN AALST *et. al.*, 2018) and also to face challenges of decarbonization. As argued by Bach (2019), a number of climate-focused initiatives have emerged within the sector. Among them, the Oil and Gas Climate Initiatives (OGCI) brings together 10 of the largest firms, who

account for close to 20 per cent of global oil and gas production. Founded in 2014, its members have voiced their support for current climate policy and science and have begun to reimagine themselves within a low-carbon energy future.

For the coastal and marine tourism industry, financing for the transition towards ecotourism is critical. It is essential to have in mind that coastal and marine tourism is one of the largest segments of the maritime economic sectors, as well as the largest component of the tourism industry. Coastal and marine tourism often raise controversy regarding the environmental effects and the compatibilities with other human activities.

In the marine biotechnology industry, new investments can lead to the expansion of research and development of products on a commercial scale. Marine biotechnology provides opportunities for a wide range of initiatives of commercial interest for the pharmaceutical, biomedical, cosmetic, nutraceutical, food, feed, agricultural, and related industries. (ROTTER, 2021, LLOYD-EVANS, 2014).

As for renewable ocean energy, new investments in offshore wind energy aim to increase market confidence in this sector, reducing the perception of risk, in addition to contributing to increasing the share of renewable energy contribution in the energy sector. (OCEAN FOX ADVISORY & FRIENDS OF THE OCEAN SECRETARIAT, 2020). Ocean energy technologies, such as tidal, current and wave energy, require funds to achieve the commercial stage. Technologies close to commercialization with a functional full-scale prototype face a lack of financial support when trying to deploy the technology in the water and generate electricity. As ocean energy can be a solution to decarbonize other sectors of the ocean economy, funding will also be needed to adapt and implement these types of energy to sectors such as tourism, shipping, desalination and aquaculture (IRENA, 2020).

Investments for the Blue Economy can encompass the protection, conservation and restoration of ecosystem services provided by coastal marine environments. Costs for maintaining, for example, biodiversity and natural infrastructure may be less than the benefits generated. Consequently, the direct funding to ensure provision these ecosystem services is essential and can be done, for example, by means of protected marine areas (CBD HIGH LEVEL PANEL, 2014).

In spite of the diverse array of sectors, options and focus for investments in Blue Finance, almost all opportunities presented in Table

2 have a common feature: they require a long period to achieve the break-even point from a financial and, also, from an economic perspective. In situations such this, public financial institutions have a key role to play. However, financial budget resources usually have high opportunity costs, particularly in developing countries, where demand for education, health, infrastructure are significant. In such reality, alternative sources of Blue Finance have to be contemplated.

FINANCING MODALITIES OF BLUE FINANCE

Different areas that require investments to the transition towards a Blue Economy require specific modalities or arrangements of financing (traditional or innovative) to promote the conservation of the oceans and boost the sustainability of ocean activities (Wabnitz & Błasiak, 2019). As mentioned before, the spectrum of investments ranges from those that generate social and environmental impacts with little or no expectation of significant financial returns to those that are highly driven by financial returns.

Financial resources invested in sustainability projects of the oceans that do not expect significant returns can be called "*impact-only investments*" as they seek social and environmental outcomes from the funded activities. Within this group, the main modalities are investments of public resources, Official Development Assistance contributions and philanthropy (OCEAN FOX ADVISORY & FRIENDS OF THE OCEAN SECRETARIAT, 2020).

Investments of public budgets constitute the application of resources, collected through taxes, in activities that constitute government obligations, such as management of ocean activities, maintenance of marine protected areas, among others (BERGER *et al*., 2019). Due to the basic profile of projects of Blue Economy, emphasized in the previous section, resources from public budgets are - and will remain for some time – a key source of financial resources to support them. In spite of their importance, public budgets usually face serious constraints and have alternative uses. These aspects have stimulated the establishment of institutional arrangements between the public and private sectors to finance Blue Economy investments, as detailed below.

Contributions from ODA (Official Development Assistance) are financing usually in the form of donations from one country directly

to another (bilateral assistance) or through a multilateral institutions, including UN agencies, where funding from many nations is pooled (OCEAN FOX ADVISORY & FRIENDS OF THE OCEAN SECRETARIAT, 2020). It is important to emphasize that ODA is one of the main sources of resources for ocean-related projects. Between 2003 and 2016, approximately US$7.1 billion was earmarked for marine issues. Among the donor countries, France and the United States are the largest and among the multilateral agencies, the Global Environmental Facility (GEF) was the largest donor in this modality (BERGER *et al*., 2019). In 2018, the GEF approved among its lines of credit, a specific line of support for Blue Economy. The objective is to support beneficiary countries to strengthen the opportunities of the Blue Economy through three areas of strategic action: maintenance and conservation of healthy coastal and marine ecosystems; sustainable fisheries management; and reducing pollution in marine environments (GEF, 2018).

Philanthropic resources, in turn, come from non-governmental sources (NGOs, private foundations, business foundations) that invest in projects focused on sustainable development and support actions that would not normally be attractive to other types of investors. Like the official development assistance model, philanthropy makes a substantial contribution to actions to conserve the coastal and marine environment. These actions include, for example, scientific research, sustainable marine fisheries and protected areas (Berger *et al*, 2019; OCEAN ADVISORY FOX & FRIENDS OF THE OCEAN Secretariat, 2020).

Funds from *impact-only investments* contribute significantly to "conservation trust funds" (CTF). These CTF[3] are financial mechanisms that catalyze resources to be applied upon biodiversity conservation. The resources can be applied to the management of protected areas in a country, as well as other development initiatives outside protected areas, such as sustainable fishing, ecotourism and recovery of degraded ecosystems (IYER *et al*., 2018). Conservation trust funds generally include a long-term financing mechanism under an endowment or amortization (sinking fund) model.

From the initial composition of the fund, a business plan for

[3] Conservation trust funds are advantageously positioned to work with governments and in partnership with civil society organizations allow joint action by the main actors in biodiversity conservation. In addition, in the long term, the funds may enable the establishment of other conservation financing mechanisms (IYER et al., 2018).

investing resources in low-risk portfolios is established to ensure the return on investments to make up the amount of the fund itself (OCEAN FOX ADVISORY & FRIENDS OF THE OCEAN SECRETARIAT, 2020). Resource management is done independently and under specific governance rules and expected results. Conservation trust funds act as financing and non-implementing entities of conservation actions. For the implementation of the actions, these resources managed by the funds are transferred via donation to NGOs, community-based organizations and government agencies (such as national agencies for protected areas). In Brazil, an example of a conservation fund applied to coastal and marine areas is the Protected Marine and Coastal Areas Project (Projeto GEF-Mar), which aims to promote the conservation of coastal and marine biodiversity through protected areas (GONÇALVES *et al*., 2018).

As mentioned above, the financing of actions for ocean conservation through *impact-only investments* are one of the main sources of financing for marine conservation purposes (BERGER *et al*., 2019). They can be classified into three groups: those who seek to maximize impact and secondarily, expect financial returns; those who primarily seek market rates or premium returns and, secondarily, seek a positive social or environmental impact; and those looking to invest to help build the infrastructure and impact investing industry. However, such resources may not be sufficient for the transition to the Blue Economy and there is a need to explore other investment alternatives, especially focusing on private capital and market-based alternatives, with the recent growth of the model called "*impact investments*" (PASCAL *et al*., 2018).

According to the Global Impact Investing Network (GIIN), *impact investments* are made with the intention of generating positive and measurable social and environmental impacts, as well as financial returns. Impact investments can be done in emerging markets and in developed markets. These investments aimed to reach a range of returns below the market rate, depending on the strategic objectives of investors.[4]

Impact investors include multilateral organizations (e.g. World Bank), conventional financial institutions (large international banks), high net worth individuals, pension funds, insurance companies and investment funds (PASCAL *et al*., 2018). Despite being a small proportion, impact investments are on the rise. Specifically, a private investment in marine biodiversity and ecosystem services is at an early stage of

[4] https://thegiin.org/impact-investing/need-to-know/" \l "what-is-impact-investing").

development. Impact investments can be made via various asset classes, including bonds, debt financing, equity and loan guarantees (PASCAL *et al*., 2018).

Investments in bonds ar

ance actions for nature conservation and sustainable development. Generally, a bond is a form of debt guarantee, in which investors become parts of the issuing entity, receiving fixed interest on a fixed schedule and having returned their initial investment at maturity (ROTH *et al*., 2019). Nature bonds, in turn, are financial instruments issued by corporations, government agencies or organizations to borrow money from investors for projects that conserve and sustainably use nature. The bond's earnings are then invested in projects that align with criteria defined by the bond issuer in order to generate measurable environmental benefits and financial returns. Examples of "nature titles" are green titles (green bond), climate bonds and, in the case of Blue Economy, the Blue Bonds (IYER *et al*., 2018).

The Blue Bonds are debt securities issued to raise capital specifically to fund the implementation of the Sustainable Development Goals related to the ocean as well as the transition to a Blue Economy to strengthen the "blue" natural capital. Allied to the principles of sustainable Blue Economy financing, Blue Bonds have a strong potential to become a financing instrument for achieving the Blue Economy in developed countries, as well as in developing countries (ROTH *et al*., 2019).

The Sovereign Blue Bond of the Republic of Seychelles was the first sovereign bond issued in 2018, with a maximum value of US$ 15 million and a maturity of 10 years. The program was structured with support and co-financing from the World Bank and the GEF, acting as guarantors and partially subsidizing the payment of bond yields. As the total value was relatively low in market terms, it was privately placed with three US-based impact investors. The resources have been used to capitalize funds (Blue Grants Fund and Blue Investment Fund), each of which provides financing for marine and ocean-related activities that contribute to the transition to sustainable fishing and development of the country's Blue Economy (THE WORLD BANK, 2018).

Another example of a blue bond was issued by the Nordic Investment Bank (NIB) launched in 2019. The Nordic-Baltic Blue Bond is worth US$200 million with a five-year duration with the objective of

financing projects to protect and rehabilitate the Baltic Sea. The investor portfolio is made up of pension funds and insurance companies, asset managers and banks. To date, resources have financed eight projects located in Norway, Sweden and Finland that aim to improve wastewater treatment (NIB, 2019).

In general, other types of bonds can also finance coastal and marine ecosystem conservation projects, such as "conservation impact bonds" or "pay-by-result / performance bonds". They aim to pay for future costs of a specific environmental outcome (verified from performance indicators). Cost savings are derived from implementing more efficient conservation programs that generate sufficient income. Once the intended environmental result is achieved and verified, the investor can expect to recover its capital plus interest (IYER et al., 2018; OCEAN FOX ADVISORY & FRIENDS OF THE OCEAN SECRETARIAT, 2020). Similarly, "project bonds" can be issued to fund projects for environmentally sustainable ocean such as ocean renewable energy and maritime transport infrastructure. The return on investment materializes in the profits obtained by the activity (OCEAN FOX ADVISORY & FRIENDS OF THE OCEAN SECRETARIAT, 2020).

The role of marine and coastal ecosystems as flood barriers for control and reduction of extreme impacts event raises an alternative model to finance the restoration and protection of these ecosystems. This model is embodied as "resilience securities or bonds". They are designed to finance projects that promote reduction and losses caused by extreme events and recovery actions when they occur. The concept is based on "catastrophe bonds", an insurance model. However, in its conception it is recognized that initial investments in programs that promote resilience will help to reduce higher expenses in the event of a catastrophic event (IYER *et al*., 2018; VAIJHALA & RHODES, 2018)[5].

Application of resilience bonds into Blue Economy issues can be based on the concept of natural ecosystem infrastructure and regulatory services provided by coastal and marine ecosystems. Reefs

[5] Considering that the avoided losses are necessary to establish a revenue stream, the modeling of the projects to be financed must consider the "business as usual" perspective versus the situation in which the project is installed. The difference in expected losses between the two scenarios can be used to finance the project (VAIJHALA & RHODES, 2018).

and mangroves, for example, have demonstrable protection capabilities to reduce the impact of major storms. Investments in the restoration and conservation of these ecosystems could, therefore, help reduce the risk of physical damage and from extreme economic events on a quantifiable basis (IYER *et al*., 2018).

Debt financing can also be a mechanism to generate resources for the conservation of marine and coastal ecosystems and actions for the sustainable use of natural resources. An important example is the "debt for nature swaps". This mechanism consists of a financial transaction in which a country's external debt obligations are exchanged or forgiven for an investment and commitment to the protection of nature. In this operation, the debtor government undertakes to invest resources in environmental conservation in exchange for partial debt forgiveness (IYER *et al*., 2018; OCEAN FOX ADVISORY & FRIENDS OF THE OCEAN SECRETARIAT, 2020; UNDP, 2017).

The feasibility of a debt for nature swap operation depends on the willingness of the creditor (which may be a country or a commercial institution) to forgive part of the debt of a debtor country (or island state) conditional on making periodic investments in conservation. The debt can be sold to a third party for a reduced amount and the application of resources for the viability of conservation projects can be made in trusts for conservation (UNDP, 2017). The mechanism of exchange of debt for nature has been used for decades and its application to the transition to a Blue Economy can be exemplified by the operation carried out by the Republic of Seychelles, whose debt swap negotiated with creditors enables the financing of the implementation of planning the country's marine space (IYER *et al*., 2018).

The role of the public sector in attracting impact investors to finance the conservation and restoration of coastal and marine ecosystem services can also occur through the establishment of Public-Private Partnerships (PPP). This model has been implemented, for example, in the management of marine protected areas. The PPP's in this case are structured in such a way that the conservation objectives of the protected areas are maintained, but the management is done under a business model that generates a return on the investment made by the private sector, normally through tourism charges. In this way, shared management (public-private) has the

possibility of leveraging resources for the maintenance of protected areas, in addition to generating income for the investor and achieving positive social and environmental impacts (PASCAL *et al*., 2018).

Financing models that can offer higher returns to investors but are linked to increased risk may also contribute to the transition to a Blue Economy. These investments range from venture capital[6] to purchase shares in mature companies that have been operating in the market for some time. Considering the project development stages and companies, an initial investment opportunity in a Blue Economy is the initial funding or seed investing. The seed investing is a preliminary round of financing for new companies that are in an early stage or even pre-operational. This type of investment is common in different sectors, especially with a focus on technological development. It is often linked to accelerators[7] and incubators[8] (BNDES, 2017; OCEAN FOX ADVISORY & FRIENDS OF THE OCEAN SECRETARIAT, 2020).

In a Blue Economy scenario the investing seed, as well as the support of incubators and accelerators, can contribute to the development of technologies and companies that offer sustainable solutions within the scope of ocean activities. The availability of this type of resource helps start-up companies to overcome the funding gap that occurs in the initial stages of building new businesses. The seed investing provides support for innovative ideas to overcome difficulties in their initial stage and to reach maturity. When mature they have access to wider range of credit and financing opportunities, especially from impact investors. (IYER *et al*, 2018; OCEAN FOX ADVISORY & FRIENDS OF THE OCEAN SECRETARIAT, 2020). Currently, there are different institutions that act in the early-stage business financing, contributing to the investing seed, venture capital and business support via incubators and accelerators. These institutions direct investments to sectors such as biotechnology marine, sustainable fisheries and aquaculture, and waste management.

Companies that are already established can obtain investment

[6] "Venture capital" refers to capital contributions (investments) for the acquisition of shares in companies not listed on the stock exchange, that is, those that have not yet been carried out to public offering of shares (BNDES, 2017).
[7] Accelerator: Institution that invests in new companies, usually in exchange for equity interest, with the objective of developing the business by accelerating growth. It can offer, in addition to financial resources, knowledge (mentoring) and relationship networks (BNDES, 2017).
[8] Incubator: Institution dedicated to initial support for start-up and innovative companies. They offer material and intellectual resources to entrepreneurs so that they can transform ideas into sustainable businesses (BNDES, 2017).

through a public offering of shares traded by anyone on a stock exchange. Advantages include greater liquidity of public equity as well as greater transparency regarding financial performance. In the Blue Economy, the sectors that are likely to be publicly traded are the larger and more established sectors, such as tourism, energy, maritime transport and industrial fishing (OCEAN FOX ADVISORY & FRIENDS OF THE OCEAN SECRETARIAT, 2020). Table 3 summarizes the mentioned financing strategies, which can be observed and expanded to the different areas of the Blue Economy.

Table 3 : Financing Models in the Blue Economy and examples of implementation.

Financing Model	Exemples
Conservation Trust Fund	GEF-Mar Project
Blue bonds	Blue Bonds of the Republic of Sychelles; Nordic-Baltic Blue Bond.
Exchange of debts by nature	Republic of Sychelles: debt refinancing for ocean conservation.
Public Private Partnership	Concession of marine protected areas for private initiative in joint management with the government.
Seed Investing	Blue Bio Value; Katapult Ocean

Source: Own elaboration based on Iyer et al. (2018); Ocean Fox Advisory & Friends of the Ocean Secretariat (2020); and Pascal et al. (2018).

The Blue Bio Value financing model focuses on the support of ocean-based solutions that contribute to the Blue Economy. For example, in Portugal, through the Blue Bio Value's startup acceleration program, 42 startups from 15 countries have received support to develop their business since 2018, which includes mentorship, grant and access to facilities in the areas of marine biology and biotechnology in Portugal." (see https://www.bluebiovalue.com/). In a similar fashion, the Oslo-based Katapult Ocean

is world-renowned for its intense three-month ocean impact accelerator program that brings together a global network of over 100 mentors and partners as well as promising startups making a positive impact on our ocean. Since 2018, they have received applications from startups across the globe and has made 32 investments across 16 countries and four continents (see https://thehub.io/funding/katapult-ocean).

FINAL COMMENTS

Productive activities based on the oceans are fundamental to the economy. However, negative impacts caused on coastal and marine ecosystems resulting from economic activities require an approach that encompasses not only economic efficiency but also the sustainable use of natural resources. This approach must ensure the continued provision of ecosystem services on which the productive activities from the oceans are based: the Blue Economy.

The transition to the Blue Economy will require investments. The Blue Finance includes financing strategies and resources to be invested in the sustainable ocean economy. The increase and diversification of investments and financing sources are fundamental for the transition to the Blue Economy. However, in order to prevent these investments from generating negative impacts upon sectors, investors must follow principles established by institutions in order to guarantee the sustainability of the supported projects.

It is understood that the general guidance for Blue Finance is the Sustainable Financing Principles for the Blue Economy, which can be observed for projects related to the ocean economy. Other principles, specifically developed for sectors of the Blue Economy, such as fishing and shipping, are equally important as they allow attainment by a larger number of specific investors to these sectors.

In this paper, some needs envisioned by the different sectors for the transition to the Blue Economy were pointed out. Public resources, official development assistance and philanthropy have been the main sources of resources for marine conservation projects. It is our expectation, however, that these opportunities will be expanded as the availability of investment advances. It is important that there is innovation in the models in order to increase the participation of private capital, especially via impact financing. Therefore, the projects to be financed must have clear objectives, provide metrics for monitoring social and environmental performance, and highlight possible vulnerabilities and risks to investors.

BLUE FINANCE: OPORTUNIDADES PARA A ECONOMIA AZUL

RESUMO

As características básicas e limitações dos diferentes tipos de Blue Finance são analisadas neste artigo. As atividades produtivas baseadas no oceano têm uma contribuição fundamental para a economia global. Eles são um pilar econômico de muitos países. Estas atividades – pesca, aquicultura, transporte marítimo, turismo costeiro e marinho, exploração e produção de petróleo e gás, entre outras – têm, no entanto, efeitos negativos nos ecossistemas costeiros e marinhos. Assim, tornou-se necessário olhar com outro enfoque essas atividades econômicas. A Economia Azul representa essa nova abordagem. Contempla a realização de atividades econômicas baseadas nos oceanos de forma sustentável, garantindo a eficiência econômica, com inclusão social e a manutenção da saúde dos ecossistemas costeiros e marinhos. No entanto, a transição para a Economia Azul exige contribuições de financiamento, incluídas no Blue Finance. Nessa perspectiva, diferentes ações em setores da economia de base oceânica exigem investimentos. Vão desde alternativas voltadas principalmente para resultados ambientais e sociais até aquelas voltadas para um desempenho ambiental combinado com retorno financeiro. Para orientar a alocação de recursos no âmbito do Blue Finance, foi desenvolvido um conjunto de princípios para motivar os investidores a apoiar projetos adequados à perspetiva da Economia Azul. No entanto, há um número limitado de estudos avaliando esses princípios e experimentos reais da Blue Finance. Este artigo contribui para reduzir essa lacuna no conhecimento atual, destacando potencialidades e limitações de instrumentos financeiros alternativos. Nossa análise mostra que ainda temos um longo caminho para o estabelecimento de um sólido arranjo Blue Finance para um uso sustentável de nossos oceanos.

Palavras-chave: Economia Azul; financiamento azul; investimento de impacto.

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