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The Ocean Economy: trends, impacts and opportunities for a post COVID-19 Blue Recovery in developing countries

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THE OCEAN ECONOMY: TRENDS, IMPACTS AND OPPORTUNITIES FOR A POST COVID-19 BLUE RECOVERY IN DEVELOPING COUNTRIES

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ABSTRACT

This paper discusses preliminary and still quite unknown trends on trade, finance, and technology of the ocean economy, outlines key impacts and measures taken to respond to the COVID-19 pandemic and raises awareness about the potential of the ocean economy to contribute to a sustainable and resilient recovery. Based on these findings, the paper argues that sustainability and resilience considerations should be more highly prioritized in ocean-based value chains in a post COVID-19 recovery. To support this, the paper highlights the importance of securing sufficient and reliable long-term investment and the creation of capacities to develop new and adapt existing service innovations. It calls for a **global trade, investment and innovation Blue Deal** as sister to the Green New Deal already gaining support around the world, particularly for developing countries.

Ce document examine les évolutions récentes, quoiqu'encore assez méconnues, affectant le commerce, la finance et les technologies dans le secteur de l'économie océanique ; il décrit les principales répercussions liées à la pandémie de COVID-19 et les mesures prises pour y répondre et sensibilise au potentiel de l'économie océanique à contribuer à une reprise solide et durable. Il conclut à une meilleure prise en compte dans les chaînes de valeur de l'économie océanique des considérations de durabilité et de résilience en vue de la reprise d'après COVID-19. À cette fin, il souligne l'importance de garantir des investissements à long terme qui soient suffisants et sûrs et de mettre en place les capacités nécessaires pour développer de nouvelles innovations dans le domaine des services et adapter les services existants. Il appelle à la mise en place d'un ***« Blue Deal mondial » pour le commerce, l'investissement et l'innovation****, en complément du Green New Deal qui bénéficie déjà d'un soutien dans le monde entier, en particulier dans les pays en développement.*

En este documento se debaten las tendencias preliminares y todavía bastante desconocidas relativas al comercio, las finanzas y la tecnología de la economía de los océanos, se exponen las principales repercusiones de la pandemia de COVID-19 y las medidas adoptadas para responder a esta situación, y se pretende concienciar sobre el potencial de la economía de los océanos para contribuir a una recuperación sostenible y resiliente. Sobre la base de estos hallazgos, en el artículo se sostiene que, durante la recuperación poscovídica, deberá concederse mayor prioridad a los aspectos de sostenibilidad y resiliencia en las cadenas de valor basadas en los océanos. A fin de respaldar esta circunstancia, en el documento se pone de relieve la importancia de garantizar inversiones a largo plazo que sean suficientes y fiables, así como la creación de capacidades para desarrollar nuevas innovaciones en los servicios y adaptar las que ya existen. Se insta a acordar un ***pacto azul en materia de comercio, inversión e innovación a nivel mundial*** *en la línea del nuevo pacto verde que ya está obteniendo apoyos en todo el mundo, especialmente en favor de los países en desarrollo.*

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ACRONYMS

ABNJ	Areas Beyond National Jurisdiction
ADB	Asian Development Bank
BNCFF	Blue Natural Capital Financing Facility
CBI	Climate Bonds Initiative
DAC	Development Assistance Committee
EDF	Environmental Defense Fund
EIB	European Investment Bank
ESG	Environmental, Social and Governance
FAIRR	Farm Animal Investment Risk and Return
FAO	Food and Agricultural Organization
GBP	Green Bond Principles
GCF	Green Climate Fund
GDP	Gross Domestic Product
GLP	Green Loan Principles
G7	Group of Seven
IEA	International Energy Agency
IFC	International Finance Corporation
IMF	International Monetary Fund
IPC	International Patent Classification
IRENA	International Renewable Energy Agency
MDB	Multilateral Development Bank
MCS	Monitoring, Control and Surveillance
MFN	Most-Favoured Nation
NTMs	Non-tariff Measures
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development
SDGs	Sustainable Development Goals
SIDS	Small Island Developing States
SMEs	Small and Medium sized Enterprises
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNDESA	United Nations Department of Economic and Social Affairs
UNDOALOS	United Nations Division for Ocean Affairs and the Law of the Sea
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNGA	United Nations General Assembly
UNWTO	United Nations World Tourism Organization
WTO	World Trade Organization
WWF	World Wide Fund for Nature

I. INTRODUCTION

The huge disruption caused by the COVID-19 pandemic produced impacts never seen before in the global economy during 2020-21. Uncertainty and multiple uncoordinated health, sanitary and economic responses rolled out extremely rapidly across the globe. In 2020, global gross GDP contracted about 4.3 per cent and while rebound is profiling itself at a similar number in 2021 (UN, 2021a), UNCTAD noted that what looked like a "V for vulnerable" soon morphed to "K", meaning that for many, things continued to get worse. The pandemic has also made even more evident the low level of global preparedness to respond to certain global challenges; the fact that none can be secure when some remain insecure; and the impossibility of generating further development without preserving our marine and terrestrial natural capital. All three factors reveal the current fragility of international cooperation.

The objective of this paper is to improve understanding and engagement around the ocean economy and its special role in a post COVID-19 recovery, by both developing and developed countries. To do so, this paper introduces general trends on trade, finance, and technology in the ocean economy, outlines key impacts and measures taken to respond to the COVID-19 pandemic, and highlights important gaps and fragilities that undermine the potential of the ocean economy for a sustainable and resilient recovery. All that by seeking to build back better the ocean-based value chains, profiling a new global blue deal, and enabling investment in and access to sound marine innovations. The paper concludes with a set of action-oriented policy recommendations towards a post COVID-19 Blue Recovery in trade, finance, and innovation.

These policy recommendations need to be put in place as soon as possible, because the pursuit for SDGs has been put back years in practice and some goals may not even be achievable now. The increasingly fraught inter-dependency between the natural and man-made environments has been highlighted in ways we can no longer ignore, with the pandemic considered most likely to have been caused by an animal vector-borne virus.[2] Without conservation, restoration and a renewed commitment to sustainable use, the deterioration of human and the planet's health appears unavoidable. To bring progress back to the original SDG ambition, there is a need to deeply reorient action and coordinated efforts towards global safety and equitable economic recovery. Recent decades have seen a growing awareness of this for the land-based economy and now it is time for similar awakening regarding the ocean economy.

[2] If this proves not to be the case, there are still many other examples of the fallout stemming from the clash between man and nature, including SARS, MERS, Ebola and Zika to name just a few.

II. WHY THE OCEAN?

Sustainable Development Goal 14 (life below water) is a key pillar to global sustainable development and equity ambitions and may even be a significant part of the solution. Oceanic resources and ecosystems represent more than 70 per cent of the biosphere and will be a key factor to enable a global sustainable recovery. The ocean connects us, with over 80 per cent of the volume of world trade carried by sea, and it enables many economic activities that support livelihoods and allow societies to prosper (UNCTAD, 2020a). Oceans are home to 80 per cent of the world biota and their ecosystems have a higher diversity of living organisms than terrestrial ecosystems (Suleria, 2015).

This paper argues therefore, that implementing and investing in SDG 14 goes hand in hand with sustainable trade in ocean-based goods and services and in investing in a Blue Recovery. It stems from the view that "sustainable" development relies on the creation of a harmonious, virtuous and dynamic cycle between economy, society and the environment. Today, the sustainable development of the ocean economy, including fisheries and aquaculture, coastal tourism, maritime transport, offshore renewable energy, ecosystem services and marine genetic resources, holds considerable promise for coastal and island developing nations in terms of creating jobs and revenue generating activities as well as supporting cultural values and traditions. At the same time, these nations face important financial, trade-related and environmental challenges, including fish stocks depletion, marine and coastal pollution, ocean acidification, natural disasters and climate change impacts, as well as constraints in terms of access to geography, connectivity, capacity and access to adequate financial resources. The role of trade of ocean-based goods and services, blue finance and marine innovation can only be underlined in responding to these challenges.

A sustainable and resilient ocean economy is vital for achieving the policy objectives set out in the 2030 Agenda for Sustainable Development, as well as other international agreements, including the Small Island Developing States Accelerated Modalities of Action Pathway, Paris Agreement, the Convention on Biological Diversity and the Sendai Framework. But this is not the end of the story, there are various multilateral processes seeking to fill policy gaps in an incipient ocean economic governance that need full attention by policy makers and the international community, including the closing of WTO fish subsidies negotiations, current negotiations on a United Nations Treaty on Biodiversity in ABNJ and a potential multilateral environmental agreement tackling marine debris and plastic pollution. This is all still so new it is no exaggeration to describe it as a frontier in economics and governance, and certainly one that deserves much more attention.

III. TRENDS IN TRADE, FINANCE AND INNOVATION IN THE OCEAN ECONOMY[3]

The Ocean economy, also referred to as Blue economy has its origins in the overarching concepts of sustainable and green economy, and in the oceans and seas section of "The Future we want" outcome document of the Rio + 20 United Nations Conference on Sustainable Development of 2012 (UNGA Resolution A/RES/66/288, 2012). At its core, the Ocean economy refers to the close coupling of marine and coastal socio-economic development with the conservation and sustainable use of marine resources and ecosystems (UNCTAD, 2016), with a particular attention to gender, poverty, equity, and vulnerable coastal groups. These are building blocks of any sustainable development undertaking that integrates marine and coastal environmental protection, economic development and social responsibility.

A. Trade in ocean-based goods and services

By using UNCTAD's 2020 ocean-based sector classification (UNCTAD, 2021d), the definition and measurement of the ocean economy would include:

- **Goods**: Marine fisheries; aquaculture and hatcheries; seafood processing; sea minerals; ships, port equipment and parts; renewable energy; high-technology and other manufactures.

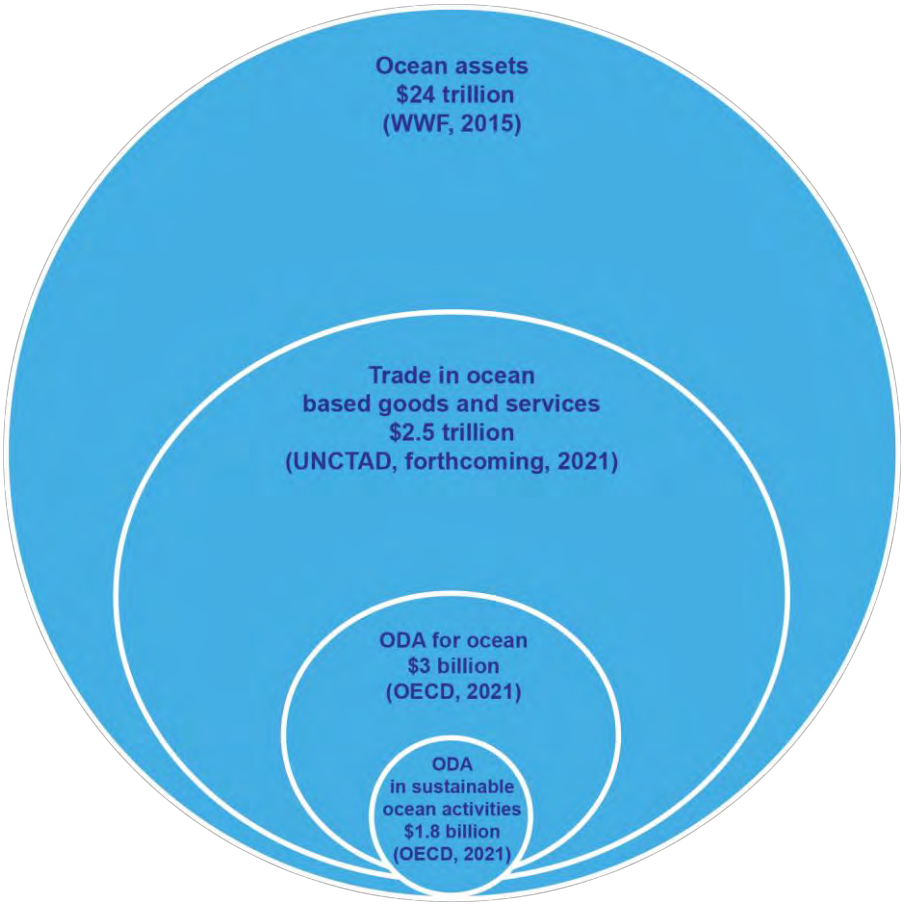
- **Services**: Marine and coastal tourism; trade in fisheries services; maritime transport and related services; port, related infrastructure and logistical services; coastal and marine environmental services; marine research and development and related services.

- **Marine renewable energy as a mix sector**: such a sector involves the generation or production of goods (e.g. electricity, marine based biofuels) as well as the provision of services (e.g. related engineering and construction services).

UNCTAD conservatively estimates that the economic value of the "ocean economy" in the form of **tradable ocean goods and services** contributes directly at least $2.5 trillion per year, but its real value, while difficult to quantify, is much larger (UNCTAD, forthcoming, 2021). For example, the value of **ocean assets**, marine resources and marine ecosystems services have been estimated conservatively to be at least $24 trillion showing the massive contribution of the ocean to sustain life and economic activities (WWF, 2015). Even this figure does not consider the overall value of coastal and marine resources, including in terms of global value chains, socio-economic benefits and important indirect benefits - such as those provided by seagrasses and mangroves in protecting coastal assets from erosion and flooding. Figure 1 shows some of the different levels of ocean economy valuation estimates.

[3] This section is based on UNCTAD (forthcoming, 2021).

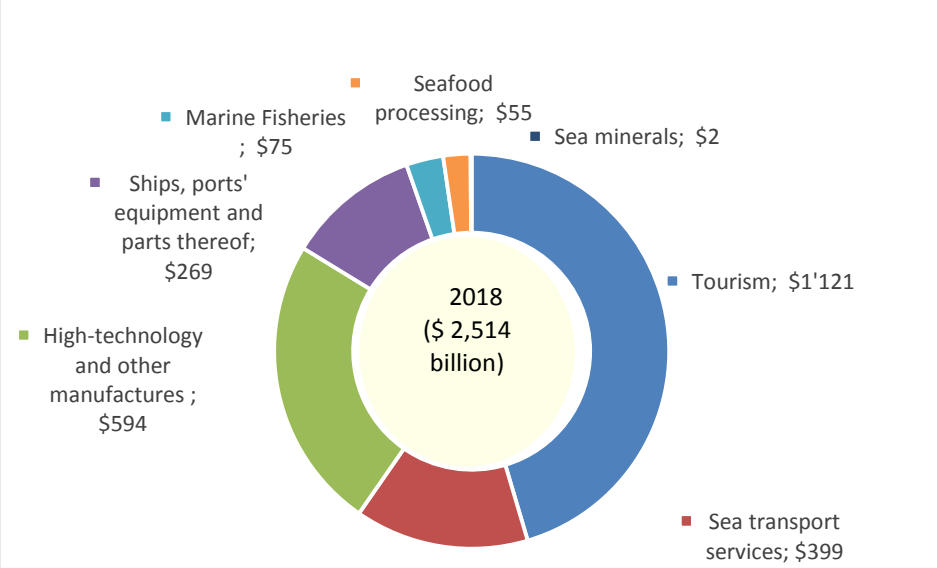
Figure 1: Measuring the sizes of the Ocean Economy



Source: Compiled by the authors (2021).

The export value of ocean-based goods in 2018 is estimated at $995 billion (about a trillion), and ocean-based services at $1,519 billion (about 1.5 trillion). Marine and coastal tourism are the largest ocean economic sector with exports of $1,121 billion, followed by high-technology and other manufactures with $594 billion and sea transport services with $399 billion export value (see Figure 2).

Figure 2: Ocean-based sector export value, 2018 ($ billion)



Source: UNCTAD (forthcoming, 2021).

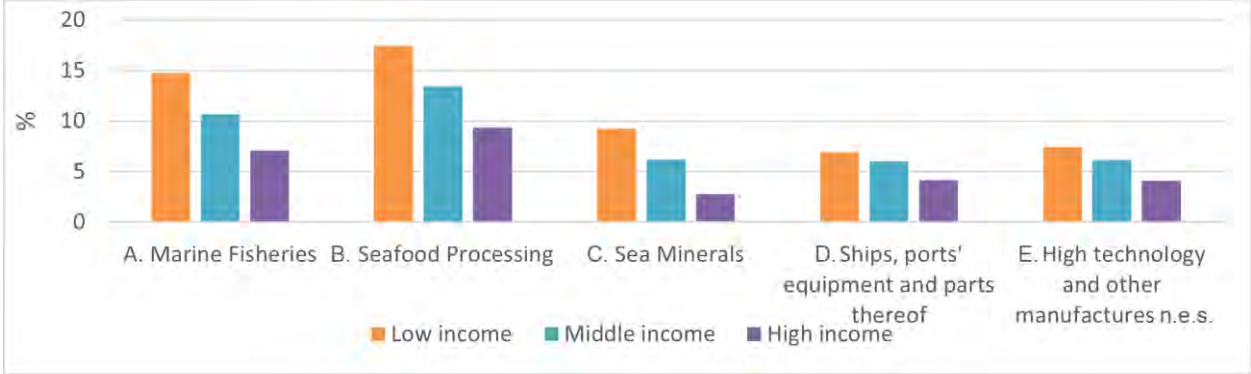
Other sectors such as marine fisheries and seafood processing[4] account jointly for about $135 billion in export value in 2018. However, these two sectors are at the same time particularly important for food security and livelihoods with about 60 million people engaged in the primary sector of fisheries and aquaculture (FAO, 2020). The leading exporters of ocean-based goods are developed countries from Europe, developing countries from Asia (even without China), followed by countries in the Americas (developed and developing). However, all this depends on the sector and countries in question.[5] At the country level, trends and patterns are different across subsectors under the UNCTAD's Ocean Economy Classification. In most subsectors, an increasing number of countries are trading sustainable ocean-based goods, particularly in less traditional industries such as processed seafood, sport boats and marine based cosmetics. The level of disaggregation, along with information on market drivers, also unveils the fact that leading developing countries are venturing into new products and value chains.

In terms of market access for ocean-based goods sectors, border tariffs tend to be the highest in low-income countries, averaging 10.18 per cent, and lowest in high-income countries, averaging 5.37 per cent. In middle-income countries, average tariffs are 7.9 per cent. Average of applied most-favoured nation rates is highest for low-income countries' imports of processed seafood (18 per cent) (UNCTAD, forthcoming, 2021). This is mainly the result of countries' desire to promote their domestic processing industries, interest in adding value or to pursue an import substitution policy, depending on the case. In the case of fish and fish products, current tariffs in large part explains significant import demand in developed countries and Asia. In the case of non-agricultural ocean-based products, low tariffs are the result of WTO obligations, as well as the growing participation of countries in preferential trade agreements, characterized by low tariff rates on non-agricultural products

[4] This number does not include freshwater fisheries and processing.
[5] For a more precise understanding of developed vs. developing countries' participation in the trade of ocean-based goods and services sectors, please see UNCTAD (forthcoming, 2021).

compared to WTO levels. Figure 3 provides an overview of the simple average of applied MFN tariffs across the five sub-sectors, by country income levels.

Figure 3: Average tariffs across ocean-economy sectors, by sector and income level



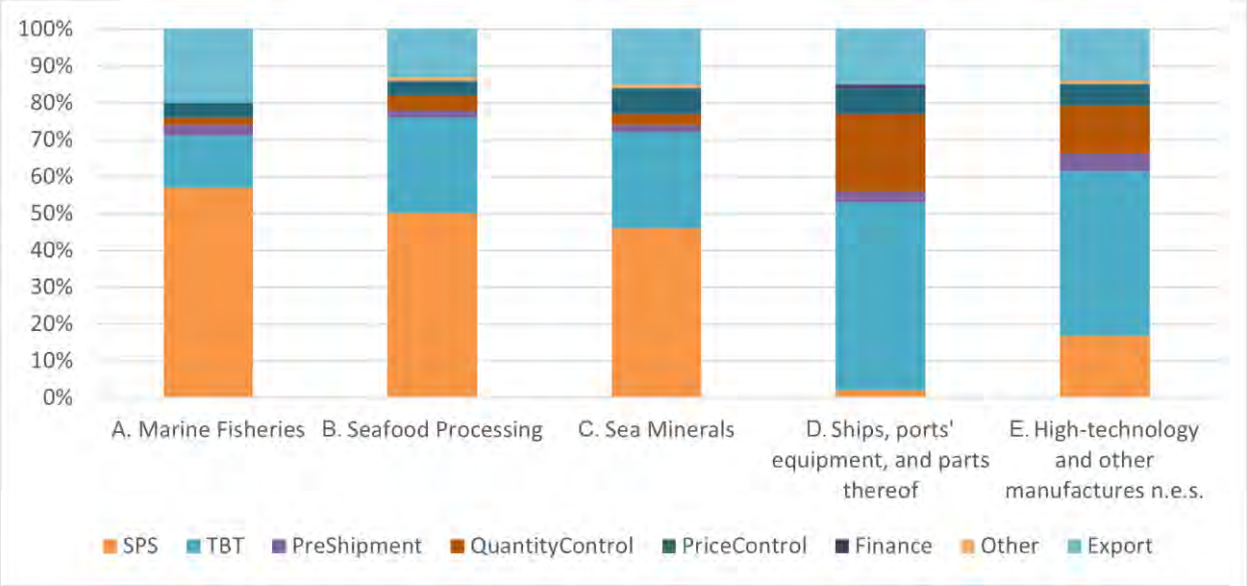
Source: UNCTAD (forthcoming, 2021).

In today's trade flows, non-tariff measures are becoming more important barriers than tariffs. In the global application of NTMs, there is a high incidence[6] present across ocean-based goods sectors. Nearly 97 per cent of the imported products face at least one import NTM and on average 6.7 different import measures apply on each product. For exports, NTMs apply to nearly 57 per cent of exported products and on average each exported product needs to comply with about two different requirements before leaving the home country for the destination markets (UNCTAD, forthcoming, 2021).

As far as the sectoral distribution is concerned, the prevalence[7] of NTMs is highest for Marine Fisheries, followed by Seafood Processing with 14.45 and 12.74 NTMs applied per traded product, respectively. The prevalence of NTMs is relatively lower in Sea Minerals and High technology and other manufactures, with an average of 4.93 and 4.97 NTMs applied, respectively; and lowest for Ships, ports' equipment and parts thereof for which an average of 3.04 NTMs are applied per product (UNCTAD, forthcoming, 2021). See Figure 4.

[6] Incidence refers to the percentage of traded products to which at least one NTM applies.
[7] Prevalence refers to the average number of NTMs applied per product.

Figure 4: Types of NTMs in the ocean-based economy



Source: UNCTAD (forthcoming, 2021).

B. Blue finance and investment[8]

Securing a Blue Recovery and transformation of the global ocean economy is going to involve the largest investment push ever seen – as with the wider low-carbon and Green New Deal ambitions in which this vision is usually nested. Unlike with trade, it is not possible to trace out trends in ocean finance and investment although this will likely change as the ocean economy as a concept is increasingly on the radar screen of investors and banks and other economic actors around the world. Some are working towards developing a typology of blue economy sectors and segments as well as going the extra step of defining some principles for sustainable investment. At present there are still many different definitions of the "ocean/blue economy", some of which prioritize the subset of "sustainable ocean economy" in their frame and some that do not.[9] Reflecting these challenges, the many useful studies and research publications coming out recently on the ocean economy tend to define and describe existing or potential sources of finance and investment without putting financial numbers on them (see for example ADB, 2020; de Vos *et al.*, 2020; Sumaila *et al.*, 2020). Figure 5 is a simplification of their investment message: ocean activities that have a reasonable chance of generating an income (column 1) can attract equity, loan and venture capital investors, as compared to the activities that do not have this potential (column 3) on which those activities depend. Some activities, where there may be a financial return but perhaps not for a long time, or where broader social and economic benefits outweigh financial returns, or where it will be difficult to insist on payment, can be financed by a mix of public and private finance (column 2) (see e.g., the China European Union Blue Industry example[10]). There are parallels with what the green literature defines as

[8] This section is based on UNCTAD (2021e) and Barrowclough *et al*. (forthcoming, 2021).
[9] Compare for example the World Bank https://www.worldbank.org/en/news/infographic/2017/06/06/blue-economy; High Level Panel for a Sustainable Ocean Economy https://www.oceanpanel.org/; Blue Economy Cooperative Research Centre https://blueeconomycrc.com.au/; Centre for the Blue Economy and Innovation https://cbei.blog/about-us/; and the OECD https://www.oecd.org/ocean/.
[10] For example, the China-European Union Blue Industry Park, initiated in 2017. Built on reclaimed land, it aims to become a hub for maritime cooperation and industrial development, including deep-sea submersibles, seabed robots and marine mineral exploitation, as well as marine energy and ecological protection. The Park is a core

"adaptation" activities compared to "mitigation"; both are green, but only the latter is expected to earn revenue (see e.g. EIB *et al*., 2021; UNCTAD, 2021e).

Figure 5: Who will fund what in the ocean economy?

Category of activity /likely means of finance	***Potential to earn a financial return*** *High ----------Moderate, under certain conditions----------Low*		
	1.Markets: green and blue bonds, equities, venture capital	*2.Mixed institutions and instruments: Concessional loans, public banks, debt for nature*	*3.Non-market: Official Development Assistance (ODA), grants and philanthropy, results-based finance*
Ecosystem and natural resource management	Some aquaculture, seafood processing and distribution, some fisheries.	Some fisheries, aquaculture and mariculture, specific conservation with Trusts and communities	Conserving ocean, coastal and marine ecosystems, mangrove and wetland ecosystems, river courses
Pollution control	None	Some peripheral activities - waste collection and management, some water collection and waste treatment	All activities and core systems - Waste management, wastewater management, circular economy
Sustainable development and infrastructure	Shipping, port services, coastal and island accommodation and tourism services, sea tours and cruises	Some elements of coastal and maritime tourism, some ports and shipping investments	Coastal resilience, alternative fuels and energy

Source: Barrowclough *et al.* (forthcoming, 2021), adapted from ADB (2020), Credit Suisse (2020), de Vos *et al.* (2020), OECD (2020a) and Sumaila *et al*. (2020).

As shown in Figure 5, tourism and fishing can readily attract investment because they offer a potential revenue stream and income generating opportunities, especially if they are in oceanic regions that are already high growth such as East Asia and parts of the Pacific Ocean. However, their viability depends on prior investments in ecosystem services and natural resource management, sustainable infrastructure and pollution control that do not find it easy to attract investment and tend to rely on grants or highly concessional loans

start-up of the broader marine industry base being created around the city of Shenzhen, unofficially known as China's Silicon Valley. It is promoted by city authorities and the national government, with a 50 billion RMB marine industry development fund, plus 250 million RMB annually and 100 million RMB to finance research. Participants in the scheme are promised rent reductions and rent-free housing, in addition to the infrastructure facilities. Such a project is clearly ocean-oriented and has involved public as well as private finance; but may or may not be blue.

(ADB, 2020, p. 4; de Vos *et al.*, 2020; Sumaila *et al.*, 2020). It is this category that needs a massive scaling up of finance most, however the very defining features of the ocean are what make it so difficult.

These issues are already well discussed in the green finance literature. It is not easy to find green finance that is truly transformative or sustainable, as opposed to finance that may be green more in name than impact: out of close to $1 trillion designated "green bonds", only $100 billion have been certified as meeting pre-defined environmental standards (CBI, 2020). Similarly, in the ocean economy: it supports many economic activities and is growing rapidly, yet parts are undermining the long-term viability not to mention sustainability of the ocean and the planet, and only a small part is directed towards solving those problems. Unfortunately, as shown below, the challenges are even greater for blue than for green finance. From the outset, in the world's ocean, SDG 14 Life Below Water receives the least investment globally out of all the SDGs (FAO, 2018); ODA is extremely low; in the mixed-market mechanisms such as blended funds or "impact" investments only a few include a concessional or sustainability-oriented element (Basile and Dutra, 2019; Libes and Eldridge, 2019); and it is widely agreed in all the ocean literature that market mechanisms are not very likely to provide finance for the kinds of conservation and adaptation investment that tourism, fisheries and other economic activities ultimately depend on.

Non-market financial instruments and institutions

ODA is an essential source of international finance for countries that lack the domestic resources needed even for fundamental activities, such as waste disposal and water treatment services. According to the OECD, only 1.6 per cent of total ODA was targeted to the ocean economy over the years 2013-2018, accounting for some $2.9 billion per annum. Moreover, the more narrowly defined category ODA for the sustainable ocean economy, received only 0.8 per cent of the total, or $1.5 billion per annum.[11]

Most of this ODA went to infrastructure projects in marine transport, which is one of the categories most likely to be able to generate an economic return, and therefore potentially fundable in other ways. Of the total ocean ODA given to the largest recipients, only one third was considered to integrate sustainability. "These figures suggest that increases in ocean-related ODA have not been driven by deeper integration of sustainability into ocean-based industries or by larger investments towards the conservation and restoration of ocean ecosystems" (OECD, 2020a). On the other hand, sustainability concerns were met in the small allocations made to the bottom 50 recipients; and exceptions to the trend included important concessional loans to Bangladesh for coastal embankment improvements and biodiversity offsetting measures to protect coral reefs in Madagascar.

ODA is not only very low, it is also geographically uneven, being concentrated in just a few countries. The top 20 recipients accounted for 75 per cent of the total. Indonesia, Vietnam and Morocco were the largest single recipients, and a very small proportion went to the poorest countries. SIDS, which are particularly dependent on and deeply exposed to the ocean economy, and highly dependent on ODA in their financing landscape are also poorly served. Only 5.5 per cent of ODA to SIDS is directed at the ocean economy – accounting for around $296 million per year during the period studied; and of this just $145 million per annum across all SIDS was described as directed to being sustainable.

Such small amounts of finance are a concern not only for SIDS but for everyone, because SIDS play an important and often overlooked role in efforts to stop climate change – being a valuable source of minerals, natural gas and seafood as well as for their position in global

[11] OECD 2020 Creditor Reporting System database, in OECD (2020a).

geopolitics. The Pacific SIDS are host to vast under-water minerals and already being approached by large companies for deep-seabed mining prospecting, with worrying implications for fragile ecosystems and fish-feeding grounds upon which many countries depend. Reflecting this and aware of their vulnerability, many SIDS have already developed blue ocean economy strategies that attempt to balance their financing needs with environmental concerns, including the Seychelles, Mauritius, and Grenada; others have set up blue economy ministries, or declared their exclusive economic zones – some of which are very large because they include many small islands - to be protected marine areas. While these could be positive for the environment, they do not necessarily create income generating opportunities – thereby confirming the need for ODA.

Global multilateral funds such as the Green Climate Fund could be an important source. However at present, "ocean" or "blue" is not a particular category nor one of the Fund's eight strategic priorities. This is perhaps not surprising given the high level of cross-cutting elements involved and suggests further research is needed to define categories, monitoring and certification requirements etc. if only because these will help attract finance motivated by environmental, social or sustainability concerns. The GCF website cited nine projects with the words Blue or Ocean out of the total 173 projects, and not all of these were obviously related to the ocean economy let alone sustainable or blue ocean. Searching under strategic priorities of Eco-system and Eco-system Services and Transport raised the total number of ocean-related projects to 13, worth a total value of $749.8 million. Of this, the Fund contributed $438.7 million and co-financiers paid the rest – a proportion of Fund finance to co-finance that is higher than the average for most projects reflecting the challenges of getting private sector collaboration that has been raised in all the literature. Moreover, the Fund's share was mostly given as a grant not a loan as with other projects. Several of these projects were regional; including one project that supported four SIDS in the Indian Ocean, and another supporting four coastal countries in East Africa. The financing pattern presumably reflects the fact that the oceans know no boundaries and the seas and fish move freely – a fact that both defines the ocean and provokes the collective action challenges inherent with all public goods and the commons – and which means grant finance is essential.

Philanthropy is helping to fill some of these gaps and is a major source of finance for the ocean economy. According to the Funding the Ocean Foundation Maps database, since 2009 there have been as many as 66,000 individual grants to ocean and coastal projects, totalling some $10.2 billion; plus another 14,000 aid and multilateral distributions (including the OECD DAC ones that are included as ODA above) worth another $7 billion. The OECD estimates that in 2018, philanthropy provided $200 million for the ocean (OECD, 2020a, p. 115). Many grants involve not only finance but also technical expertise and engage deeply with local and regional governments, industry and citizens. A "cutting edge" example is the Ellen MacArthur Foundation's Plastics Pact, which is working toward a circular economy for plastic under a common platform with targets to reduce unnecessary plastic use and promote recycling; this has important implications for the ocean economy through its effect on plastic pollution. However, as important these contributions are, philanthropy cannot be the source on which the ocean economy relies; multilateral not bilateral support is needed for issues that concern the global commons and at the same time, governments need their own national and regional financial sources of finance with which to enact their own development strategies.

Market-based blue financial instruments and institutions

Blue and green bonds

Established since the late 2000's, green bonds are used to raise finance for activities with a link to environmental sustainability and climate change, as defined by various taxonomies

and regulatory principles[12], and there are high hopes in some quarters that blue bonds will take off as well, especially as they are a small proportion of the total global bond market. Current estimates are that the green bond market has raised some $1 trillion since 2007, through more than 6000 deals arranged by almost 1000 bond issuers (CBI, 2020). Issuers have mostly been governments and government backed entities or development banks and public issuers still dominate although the private sector is increasing its participation quickly (Figure 5).

However, this market does not seem thus far to offer enough promise for the ocean needs. Of the $1 trillion green bonds issued, apparently only around $100 billion are certified leading to concerns that "greenwashing" is rife. Some of the most important ocean activities, namely fisheries and aquaculture, are not even listed by the CBI taxonomy as having a certification category yet (CBI, 2020). And, even if certification did exist, the CBI warns that blue bonds are always going to be "dwarfed" by their green counterparts. "The added challenge in the sustainable financing and management of marine activities is that these usually lack well-defined property rights and their impacts are difficult to attribute to a given cause (unlike land-based activities where ownership and impacts are typically easier to define). An initiative to protect one marine area, for example, is likely to increase fish populations elsewhere" (CBI, 2020, p. 8).

Reflecting this, of the 5,931 total deals noted by the CBI in the years since 2007, only 50 deals were for blue projects. Most of them are related to offshore wind and other types of projects on land. The values for these 50 blue bonds issued are not given but, if an extremely rough and ready mapping can be done between the total number of issuers to the total value of the bonds issued, which was $754 billion as of the end of 2019, the proportion for blue issues would be just $6 billion. It seems much will need to change if this is to be a reliable source of finance for the sustainable ocean economy, and even this will not likely finance activities in column 3 of Figure 5.

Having said that, some interesting examples of green and blue bonds with an ocean flavor do exist, including the Seychelles blue bond issued in October 2018 ($15 million), Indonesia (March 2018, $2 billion), Hong Kong SAR China (May 2019, $1 billion), Fiji (November, 2017 at $49 million Fijian Dollars) and Chile (June 2019 at $2.4 billion). The Fijian issuance was the only one not in a hard currency. However, these are the exception that proves the rule; and the bonds were not designed to finance the kinds of activities in column 3. Fiji's bond, launched with the IFC in 2017, includes climate mitigation and adaptation purposes such as renewable energy, water and energy efficiency and clean transport that are presumably expected to earn a return that will help to repay the interest rate cost of the bond issue and also the principal. Similarly, with blended finance investment vehicles, a recent OECD survey suggests that these do not at present specify ocean as a category of interest. Also, of all the transactions surveyed, those that were done at the concessional rates that are needed for sustainable activities were mostly financed by governments (83 per cent) and not by private sector or market actors – who provided concessional rates in only 6 per cent of the transactions. This was out of proportion with their relative contribution to the total, because commercial capital did provide one fourth of the total funds (Basile and Dutra, 2019). Given that the ocean economy by definition and according to virtually all the financial literature requires concessional if not grant finance, the market side of a blended finance instrument is not likely to be the sole solution.

[12] Green bonds are expected to reflect Green Bond Principles published by the International Capital Market Association and an associated development by the Climate Bond Initiative has focused on "climate bonds" which are targeted more to climate change adaptation and mitigation.

Blue banks

Public and development banks by comparison can offer very effective instruments to counter this problem, because they are on one hand operating in the market and with market actors, but also their mandates and reason for existence is usually to provide the kinds of long-term and concessional capital that markets will not provide (Eurodad, 2017; Griffiths-Jones *et al.*, 2020; UNCTAD, 2019a). They also offer technical expertise and managerial experience as well as finance. At present there is no movement towards "blue banks" that is taking place in the world of green banking – where new green banks are being established and already existing banks are setting up green facilities. This is an important lack because virtually all the green bonds and green financial instruments that are emerging are created and administered in partnership with development or public banks with an expertise and interest in green matters. At the time of writing, there is no officially designated blue bank in the world, although there are of course national development banks in countries where the ocean economy is extremely important, and regional development banks such as the Caribbean Development Bank, whose 19 borrowing members are deeply integrated into and dependent on the ocean economy.

The role of public banks in the blue sphere is clear in the example of the Seychelles, which issued the first official "blue bond" in 2018, with the World Bank and other development banks playing an essential role in all parts of the deal. The bond was for $15 million, over ten years, with a pre-defined purpose for supporting the expansion of marine protected areas and developing the blue economy (BNCFF, 2019). The World Bank guaranteed repayment for one third of the principal amount, and the UN Global Environment Facility offered a concessional loan for part of it, and these contributions both helped to gather private sector interest to buy the bond in the first place and helped reduce the interest rate cost of the loan for the Government of Seychelles, which is repaying the bond from its central government budget. The Development Bank of Seychelles is responsible for on-lending $12 million of the amount raised, and the remaining $3 million is being spent by a conservation and adaptation trust, which gives the funds on a concessional basis or in the form of grants to private sector projects, working in collaboration with the Development Bank to do this. On the other side of the deal, the issue was purchased by three United States investment companies, two of which have an environmental mandate. Hence a deal like this involves banks in all aspects of the arrangement, including in the important task of using the funds raised in a way that will help not only pay the annual cost of the loan, but also to eventually pay back the principal.

Some multilateral banks that did not usually focus on ocean or blue activities are starting to create programmes, including the Asian Development Bank in 2019 which launched an Action Plan for Healthy Oceans and Sustainable Blue Economies for the region, with a $5 billion plan for sustainable fisheries and tourism, protection of marine and coastal ecosystems and reducing land-based pollution. The German development bank - KfW, French Development Agency and European Investment Bank also put $2 billion into the Clean Oceans Initiative to finance waste programmes over five years. While these are encouraging developments, total MDB funding for blue and green activities however remains small compared to other lending: in 2020, total climate-oriented finance from eight MDBs totalled just $66 billion, including $22 billion from the World Bank (EIB *et al*., 2021). Out of the trillions of dollars directed to other purposes this is still far too small for what is needed; also, it is not possible to determine how much of this was for sustainable green or blue activities.

C. A new innovation frontier

Technology and innovation are central for the achievement of SDG 14 in general and the trade related targets, and moreover for the overall movement towards a low-carbon

economy. Technological advances are already contributing to the cross sectoral development of the blue economy. They have allowed to increase efficiency, expand markets and enhance economic growth. However, innovations have led to both positive outcomes, such as increasing efficiencies in energy generation, as well as negative ones, including overcapacity in fisheries (UN, 2021b).

For this analysis, innovations that can contribute to the ocean economy considers those particularly designed for ocean economy sectors as well as those that can be applied and adapted to these sectors such as advances in digitalization, big data, and geospatial technologies. In the case of marine technologies for example, there is not an internationally agreed definition of what it involves, but there is a definition under brackets that can be of use in the current draft text on an international legally binding instrument under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction (UNGA, 2019):

*"[**Marine technology** means information and data, provided in a user-friendly format, on marine sciences and related marine operations and services; manuals, guidelines, criteria, standards, reference materials; sampling and methodology equipment; observation facilities and equipment (e.g., remote sensing equipment, buoys, tide gauges, shipboard and other means of ocean observation); equipment for in situ and laboratory observations, analysis and experimentation; computer and computer software, including models and modelling techniques; and expertise, knowledge, skills, technical, scientific and legal know-how and analytical methods related to marine scientific research and observation.]"*

Based on this definition, marine technology is considered in a very wide manner including information, data, data criteria, standards, materials, physical equipment, and expertise and know how. This section presents technological advances and innovation in selected ocean economy sectors and their potential to contribute to their sustainable development.

Shipping and ocean space

Technological foresight, the systematic exercise aimed at looking into the long-term future of science and technology to make better informed policy decisions (Irvine and Martin, 1984 in Pietrobelli and Puppato, 2016, p. 1), has contributed to identify technological trends with potential impact for selected sectors of the blue economy. A foresight exercise carried out by Lloyd's Register *et al.* (2015) identified main marine technology trends until 2030, and their industry wide impact in shipping and ocean space, among other sectors. They examined 56 technologies and identified eight in each sector as the most promising for their transformational impact, technical feasibility on a commercial basis and potential marketability. Table 1 shows the list of technologies identified for the ocean space and shipping sectors. According to the forecasting exercise, technological advances in ocean space will contribute to increase the understanding of the ocean space. Increasing knowledge in this area can be used to help address the effects of climate change, the reduction of land-based resources, and the increasing population. These technologies could help to support management of ocean resources and increase protection of coastal populations from natural disasters such as tsunamis and hurricanes, due to an increased understanding of the impact of human activity on the geology, meteorology and ecology of the ocean space (Lloyd's Register *et al.,* 2015).

Technological and digital innovations can also increase the productivity and efficiency of the shipping sector. According to Lind *et al.* (2021, p. 1), most of the 4,900 ports in the world are not yet using digital technologies, including for the most basic processes; 80 per cent of ports use manual solution such as white boards or spreadsheets to manage critical marine services, including towage, pilotage, and berthing. The updating of digital infrastructure in this sector will enable to retrieve, store and process data in real time. These advances will

combine machine learning and natural language processing and will allow the shipping industry to monitor performance in real time, produce alert systems and/or visualize situational awareness as needed (Lloyd's Register *et al.*, 2015). Also, autonomous, and remote-controlled robots offer the potential increased security for vessels and workers as well as and efficiency (Lloyd's Register *et al.*, 2015).

Table 1: Technologies with potential in ocean space and shipping sectors

Ocean space	Shipping
• big data analytics • advanced materials • autonomous systems • sensors and communications • sustainable energy generation • carbon capture and storage • marine biotechnology • deep ocean mining	• propulsion and powering • ship building • smart ship • sensors • robotics • big data analytics • advanced materials • communications

Source: Lloyd's Register *et al.* (2015).

Offshore renewables

The Ocean holds significant and largely untapped renewable energy potential that can contribute to the development of a sustainable blue economy. Technological developments in sectors such as ocean energy, which includes wave and tidal energy, ocean thermal energy conversion, salinity gradient energy, floating solar photovoltaic arrays and high-capacity offshore wind turbines, along with renewable-powered desalination and aquaculture contribute to provide clean energy and job opportunities (IRENA, 2020a).

Small island and developing states could significantly benefit from these technologies. Offshore wind, floating photovoltaic as well as nascent ocean technologies could help address the energy and water supply challenges of SIDS and some least developed countries (IRENA, 2020a). Advances in ocean energy can contribute to provide energy security and can enhance the sustainable blue economy in these economies.

In 2019, electricity generated from marine technologies such as offshore wind and tidal energy increased 13 per cent, which is significantly above the levels of the previous three years (IRENA, 2021b). However, marine energy still is a very small share of world renewable energy share being offshore with the most relevant, representing only about 1.2 per cent of world with 34.4 Mega Watts in installed capacity by 2020 (IRENA, 2021b), mostly in developed countries. Most ocean technologies are still at the prototype phase. Some of these technologies are just starting their commercialization stage. Current marine projects for power generation remain expensive and have not yet achieved the economies of scale needed for significant cost reductions (IRENA, 2021a). To support their development, it is necessary to focus on innovative business cases, invest in research and development, financial support to initial development and an enabling policy and regulatory environment. There is also a need for additional understanding of their environmental impact as well as regional cooperation on marine spatial planning (IRENA, 2020b).

Furthermore, additional policy support and ODA is needed for research and development to enable the cost reductions that come with the commissioning of large commercial plants and facilities, particularly for island states (IRENA, 2021a). During the 2015-2018 period ODA

allocated to ocean research was 0.4 per cent of the total ODA devoted to the ocean economy ($18 billion, 2017 constant prices).[13]

Managing ocean resources and governance

Managing ocean resources uses the science of marine biology and oceanography, of the habitats that support these resources, the oceanographic and environmental conditions that affect them, the socioeconomics that impact human choices relating to these species, and the interactions among them. This requires regular data collection through ocean surveys and sampling, assessments, analyses and forecasts of best scientific advice to debate the best options possible for ocean management.

In the last decade, technological advances in sensors and autonomous observation platforms have substantially increased observations of the ocean. In addition to the expansions, better coordination and integration of regional observation programs have led to a continuous increase in the understanding of the ocean (UN, 2021b).

At the same time, ocean governance, ocean science and marine research are important areas that can benefit significantly from investment in technological innovation, particularly digitalization and innovative automation technologies. These technologies can complement, replace or expand current methods to collect data on resources and marine biology, enforce laws and protect habitats, ecosystems and biodiversity.

Technological advances have allowed to improve the monitoring of ocean resources, which is central to ensure its sustainable use. Better monitoring of the resources facilitates its sustainable use. The use of technological and digital advances, however, is still limited in fisheries management by cost and complex data requirements as well as challenges in data sharing among fisheries management authorities and the limited human capacity to use these tools in the fisheries (OECD, 2017).

Also, many regions particularly least developed countries, have limited access to technologies that can assist them in using marine resources in a sustainable manner (UN, 2021b). Also, access to technologies is only a part of the needs. Improved cooperation and coordination to provide capacity building where it is lacking is also necessary, as well as the integration of multidisciplinary observations systems (UN, 2021b).

Fisheries

In the case of fisheries, the use of satellite data, electronic data logging, and drones have proven useful, timely and cost effective for MCS where coastal guard patrols are not deployed. Digital processing and permits have allowed more control on fishing activities and fleets. Associating coastal and fisheries communities to the use of these automated technologies can mobilize them around local citizen science initiatives that can strengthen co-management of marine living resources.

There is only a small percentage of the more than 10,000 fisheries in the world that use rich data streams and science. According to the Environmental Defense Fund (EDF, 2021), most fisheries don't have the capacity to monitor what they catch, and those that monitor what they catch use basic methods, such as paper forms, which increases the processing of data and the likelihood of mistakes in its processing. Fleets of "smart boats", with the capacity to transmit data through satellites and cellular networks can contribute to generate real time

[13] UNCTAD's calculation base on OECD data available at https://www.oecd-ilibrary.org/sites/d6a100a8-en/index.html?itemId=/content/component/d6a100a8-en.

information about fisheries and the ocean. Fleets equipped with technologies on sensors, artificial intelligence and networks including high-tech video cameras that enable to capture high-resolution fishing image; GPS antennas that provide location and time of fishing activities; sensors that enable to record the catch; and electronic monitoring computers that record the fishing vessel's telemetry and video data are some of the advances that would make fishing and ocean management more efficient, while increasing fishermen's profits and protecting marine ecosystems (EDF, 2021).

It is important to note, however, that there are risks and uncertainties associated to new technologies and innovation due to their complexities and the profound changes that they may bring about (Lloyd's Register *et al.*, 2015). For instance, the construction and installation of offshore sustainable energy plants will require significant capital expenditure and will entail a safety risk that need to be considered, particularly those associated with the production and storage of hydrogen (Lloyd's Register *et al.*, 2015). Also, it will be necessary to invest in human capital to create the capabilities to develop, adapt, service and continue innovating in these technologies.

Furthermore, despite the potential of technological and non-technological innovations for the ocean economy, many regions, in particular those with least developed countries, still lack access to technologies that can assist in using marine resources sustainably (UN, 2021b). Increasing the sustainable use of marine resources is only achievable if all countries have the capacities to monitor their own ocean economies.

In sum, collaboration to develop, identify, transfer and adapt ocean-based innovations as well as to build the capacities to benefit from them has a pivotal role in helping to achieve and improve the sustainable access, use and management of the ocean and its resources.

IV. OUTLINING THE IMPACTS OF THE COVID-19 PANDEMIC AROUND THE OCEAN ECONOMY

As noted in the introduction, in addition to its dramatic global public health impact, the rapid spread of COVID-19 around the world has generated unprecedented economic impacts. The emergency measures introduced by governments around the globe have led to severe restrictions on human mobility, economic activities and services, which have had profound impacts on coastal and ocean economies. This has been especially notable in SIDS, many of whose economies were decimated even before they had a single case of COVID-19; but the impact was great on all coastal and ocean economies because of how it was manifested through trade. Because of the measures taken to address the pandemic, **trade in goods dropped by about 6 per cent while trade in services fell by 16 per cent in 2020** (UNCTAD, 2021a). On the positive side, early estimates show that CO2 global emissions fell between 4.2 per cent and 7.5 per cent in 2020 (WMO, 2020). But this was the result of the extraordinary pandemic-induced measures and restrictions that locked down economic sectors and significantly reduced global economic activity. Last year's CO2 emissions fall is seen as an anomaly and economically unsustainable and unrepeatable (Mott, Razo and Hamwey, 2021).

There is not yet a compressive analysis of the impact of and responses to the COVID-19 pandemic on the ocean economy, but analyses exist at the sectoral level. They show a parallel and downward trend, albeit uneven, among the most iconic ocean sectors: **marine fisheries, marine and coastal tourism and maritime transport.**

Marine fisheries and aquaculture impacts of COVID-19 have varied with most countries experiencing sharp drops in catches and production during the first weeks of the pandemic, estimated at 40 per cent in the United States, 50 per cent in the Mediterranean to 80 per cent in many countries, especially SIDS (FAO, 2020). While the fishing effort may has been temporarily suspended or has declined in many COVID-19 affected countries, especially during the second and third quarter of 2020, a potential recovery of stocks could be quite modest as most fisheries studies suggest as much as 10-15 years of reduced fishing globally would be required to enable previously depleted stocks to effectively recover and increase in numbers (Hudson, 2020).

At the same time, coastal communities dependent on fisheries have greatly suffered. In developing countries with large informal sectors, the lockdown measures and social distancing especially impacted vulnerable small-scale and artisanal fishers and their communities. Inversely, trade in tuna and the tuna sector as well as aquaculture production have shown a certain level of resilience with only minor drops of 2.4 per cent in exports and 1.3 per cent in output respectively in 2020 (Vivas Eugui, 2021 and FAO, 2021). This is mainly due to the industrial nature and technology intensity of these sectors, the increased demand for shelf-stable products during the pandemic and the capacity to process and stock these perishable products for long periods; highlighting the inherent inequalities and vulnerabilities revealed during the COVID-19 shock.

About half of all tourism is destined to coastal **and marine locations** so COVID-19 impacts have been severely felt in this sector also. Global tourism suffered its worst year on record in 2020, with international arrivals dropping by 74 per cent (UNWTO, 2021), or 1 billion fewer international arrivals due to an unprecedented fall in demand, widespread travel restrictions and lockdown measures. This compares with the 4 per cent decline recorded during the 2009 global economic crisis, representing an estimated **loss of $1.3 trillion in export revenues.** SMEs and autonomous workers make up around 80 per cent of the tourism sector. They are particularly exposed with millions of livelihoods across the world - including

within vulnerable communities - relying on coastal and other forms of tourism. Cruise tourism has been particularly affected, with some companies having to put the entire crew and passengers under quarantine and many SIDS destinations losing the lion share of their clientele.

Maritime transport was also impacted. Maritime trade volumes carried on board ships and handled by ports worldwide contracted, albeit at a less dramatic rate. Ship call visits at ports worldwide fell by 10 per cent in 2021, while maritime trade contracted at an estimated 4.1 per cent (UNCTAD, 2020c). Shipping emissions have only gone down by a modest 1 per cent in 2020 (Marine Benchmark, 2021), showing that other transport modalities such as air and road may have suffered more as a consequence of the impact of the measures in place. Therefore, ensuring the sustainability of maritime transport and the climate-resilience of ports and other critical assets on which ocean economy activities depend, and on which SIDS in particular are dependent for food, energy and disaster risk management, is key to harnessing the benefits of the ocean economy for sustainable development. At the same time, the effects of lockdown served to draw attention to the often-appalling work conditions of much seafaring employment, many of whom come from developing countries.

Investment and finance trends have on the other hand gone in a very different direction for many countries and sectors, as governments around the world sharply increased liquidity and lowered the cost of capital as their core economic recovery strategy (UNCTAD, 2020b; 2021e). They created credit on a scale that was unimaginable even after the global financial crisis of 2007-2008. Trillions of dollars were issued by central banks in major economies around the world, many of which are strongly associated with aspects of the ocean economy, fuelling a credit-funded asset boom in many markets. However, as noted in the introduction, what initially looked like a V-shaped recovery soon segued into a K-shape, whereby some countries and some sectors – mostly financial ones – lurched back up and even overtook growth levels from before the coronavirus crisis but others remained in low or even falling growth. Capital flight in response to the crisis hit hard those developing countries who must pay for their transactions in hard currencies issued by the advanced economies, and depreciation of their exchange rate added to pre-existing debt vulnerabilities in many ocean economies. SIDS in particular already had high levels of external debt before the crisis, above 60% for many, and fiscal space was sorely lacking as tourism collapsed, fish revenues and remittances fell, and other sources of finance dried up (OECD, 2021a). SIDS suffered a fall in GDP of more than 6 percent in 2020, which is three times larger than the average for all developing countries, and it may take at least half a decade for them to recover, given evidence of what happened after the global financial crises (UNDESA, 2020). Some now face mounting external financial and public debt distress (IMF, 2020). This means that the COVID-19 pandemic has reinforced many of the vulnerabilities outlined in the SIDS Accelerated Modalities of Action (SAMOA) Pathway[14].

Raising the stakes still further there is now the fear of what will happen if and when interest rates rise in other parts of the world and shock already fragile exchange rates, or impact the willingness and ability of foreign governments to meet ODA commitments, or for ocean philanthropists and bond-holders to continue to support blue or green investments. Other public finance institutions may not be able to provide the “breathing space” needed. Disappointingly, while many development banks increased their capital and took various steps to accelerate and augment lending, this was not done on the same scale as during the economic crisis of 2007-2008, even though there are now climate change transition and transformation needs to finance on top of the COVID-19 demands. Multilateral development

[14] The Samoa Pathway was adopted at the Third International Conference on SIDS held in Apia, Samoa, in September 2014. It was endorsed three months later by Resolution 69/15 of the United Nations General Assembly.

banks increased their funding for climate finance in total (i.e., green and blue) just 7 per cent to $66,045 million in 2020 from $61,562 before COVID-19 in 2019; for SIDS the amount went up by more (16 per cent) from $1,115 million to $1,300 million (EIB *et al.,* 2021) but these figures are still far too small for what is needed. The World Bank increased its climate finance from just $18.8 billion in 2019 to $22 billion in 2020 and all the MDBs pledged to increase green finance further but none mentioned "blue" or ocean in particular (EIB *et al*., 2021).

At the same time, other financial flows are going in the opposite direction from what is needed. Private sector investment surged in general with the gyrations of the world equities markets, but there is no robust evidence much went into certified green (or blue) categories (UNCTAD, 2021e). On the other hand, the fossil fuel and petrochemical sector surged in the post COVID-19 period despite the high ambitions of the Copenhagen and Paris agreements, and even hopes that the pandemic recovery funds from G7 and other governments would have a low-carbon or green flavour that would be beneficial to the ocean may be disappointed as COVID-19 related finance was often neither green nor blue. Between January 2020 and March 2021, G7 nations committed more than $189 billion to support coal, oil and gas while clean forms of energy received only $147 billion, and moreover most of the fossil fuel funds were given without any conditions attached to its use – such as using it for purposes related to the transition to low-carbon (Tearfund, 2021, p. 6). This was a big disappointment to commentators who had hoped central banks and governments would use this moment to nudge big polluters to cleaner products and processes - perhaps making loans contingent on new policies for the environment for example. There was also no symmetric treatment for firms making clean energy -- only 10 per cent of the funds went to clean energy companies without conditions.

Finally, even when global policymakers do act to align post COVID-19 recovery and green or blue pledges, some ocean economies will experience this as another kind of shock, that needs special attention and support (Barrowclough *et al.*, forthcoming, 2021). For example, a carbon tax may increase the costs of flights to distant coastal tourism centres, and raise the price of imports from ocean-countries deemed to have poor environmental policies. Similarly, long-overdue multilateral coordination to tackle tax havens fuelled by illicit financial flows could be a new shock for ocean economies creating financial centres based on this market.

Technology and innovation: Prior to COVID-19, adoption of automation technology and digitization in the economy had been driven mostly by cost efficiency and competitiveness. Now, in a world concerned about pandemics, health and safety considerations have also become a central motivation. The pandemic is driving adoption of risk-mitigating protocols designed to track employee health, reduce human to human interactions, and upgrade ventilation and physical barriers during production and processing (OECD, 2020b). Increased production costs, restrictions on travel and on the mobility of migrant workers, and social distancing have accelerated digitization and automation technologies, such as robotics, artificial intelligence and vision systems for measurement, monitoring and tracking. Some of these could potentially be applied to the particular challenge of natural resource management in the ocean economy. As a result of the pandemic, technologies that improve safety at work and generate efficiency gains are likely to be retained beyond the crisis.

For example, surveys to collect data necessary for oceanography, fish stock assessments, environmental and pollution monitoring have been cancelled in most countries where they existed, following COVID-19. The few that were undertaken operated under notable health and safety restrictions. It is feared that the pandemic would cause a severe limitation on ocean science data collection, disrupted time series, with the inability to ever collect the missing data (Link *et al.,* 2021). However, governments and ocean economy sectors also have a unique opportunity to streamline conservation and environmental protection **in their**

post-COVID recovery and investment plans. Investment in green technology should include the ocean economy, with incentives to the sectors sustaining it. At the same time, recovery policies should support investment in technologies that can support ocean science, data collection and observation. Electronic monitoring programs can collect data to manage resources, enforce laws and protect habitats, ecosystems and endangered species. Also, increasing the innovation efforts in the marine research sector can contribute to developing the technologies and innovations needed to monitor and reduce pollution on the ocean, which are methods for standardizing the monitoring of pollutants, including noise, and datasets (UN, 2021b).

Digitalization can also contribute to recovery in the tourism sector. Expanded digitalization of tourism services will enable flexibility, accelerate safe contact-less services, virtual experiences and real-time information provision. The crisis is an opportunity to rethink tourism by considering the longer-term implications of investing in digitalization, supporting low carbon transition and promoting the structural transformation needed to build a stronger, more sustainable and resilient tourism economy (OECD, 2020c; 2021b).

V. TOWARDS A POST COVID-19 BLUE RECOVERY: THE ROLE OF TRADE, FINANCE AND INNOVATION

This year's recovery appears to be on track in certain parts of the world where access to vaccination has been possible or where measures for the safety of workers have been secured. In the first quarter of 2021, the value of global trade in goods and services grew by about 4 per cent quarter-over-quarter and by about 10 per cent year-over-year (UNCTAD, 2021a). Recovery is also underway across the maritime transport sector, albeit still fraught with uncertainty and progressing at different speeds across regions and shipping market segments. Closely linked to production and consumption patterns, and to developments in consumer habits, including online shopping and e-commerce, demand for shelf-stable products and containerized trade has been showing more resilience. However, UNCTAD has noted that what started as a steep V-shaped economic trend was indeed "V is for Vulnerable", because now it is clear the shape is more like a "K" as such recovery has proven to be uneven among sectors and among countries.

When seeking to build a strong and more equitable Blue Recovery the following key lines of action could be considered by UN Member States and other stakeholders:

Ocean-based goods and services and well as "Blue" BioTrade products have the potential to make their space in this post COVID-19 market setting. These products are seen not only as more sustainable but also safer for human health and the environment. For the so-called ocean-based good and services, UNCTAD applies its Ocean Pillars approach to specific sectoral ocean economic policies and value chains development. These pillars add to the traditional sustainable environmental, social and economic criteria, particular ocean considerations such as compliance with the law of the sea, trade, transport, and fisheries agreements, as well sound governance and scientific and technological policies. Additionally, the UN Compact has developed their Sustainable Ocean Economy principles as a framework for responsible business practices (particularly in terms of ocean health, productivity, governance and engagement and data gathering and transparency), allowing private sector engagement in SDG 14 implementation. More precisely, "Blue" BioTrade products are defined by a set of well-defined and recently revised principles and criteria (2020), mainly applicable to low volume and high value biodiversity-based products and services. "Blue" BioTrade products have the advantage of being of natural origin, legally harvested and sourced, traceable, biodegradable, recyclable and with a lower carbon footprint. Also, these products can be closer to markets and can directly contribute to expand local employment and to the economic recovery, particularly in developing countries. In this regard, the pandemic can be an opportunity to **"build back better"** and develop more rooted value chains on blue, circular and socially inclusive performance.

The identification of relevant codes under the Harmonised System (international nomenclature for the classification of products) for ocean-based goods as currently being done under the UNCTAD's 2020 ocean-based sector classification would facilitate their potential inclusion in multilateral or regional environmental goods negotiations. The scope of such negotiations needs to go beyond industrial goods and include the great variety of marine based natural products. Such inclusion may allow tariff and non-tariff barriers reduction and phase out for ocean-based goods, creating incentives for the marine sector to grow. This could be particularly true as mentioned above for the fisheries and seafood processing sectors where tariffs, tariff escalation and peaks are still important and where many developing countries such a China, Ecuador, Peru and Thailand are already key exporters. Technical barriers to trade, sanitary measures and export restrictions are quite present in terms of incidence and prevalence in ocean-based sectors. Mechanisms in environmental goods negotiations to address specific trade concerns, harmonisation and

complexity in compliance would make them much more meaningful in enabling trade. Additionally, the sustainability aspect of such trade can be partially addressed by relevant and credible voluntary sustainability standards which application is desirable and feasible in a developing country context without creating barriers to trade or burdensome requirements.

As lockdowns and restrictions became the new normal, **businesses and consumers increasingly "went digital",** providing and purchasing more goods and services online. Increased demand for direct delivery to households has enabled the emergence of numerous online fish and seafood selling platforms (less middlemen). In 2020, the total global value of e-commerce was about 27 trillion globally and the e-commerce's share of global retail trade went from 14 per cent in 2018 to about 19 per cent in 2020 (UNCTAD, 2021c). However, regardless of these advances, there are still concerns regarding technical, data privacy, and affordability difficulties to benefit from such digital platforms as well as regarding the concentration of ownership and market power within most common commercialization digital platforms.

Digitalization have also progressed in the public sector. Because of the pandemic many regulatory agencies in all sectors have fast tracked internal reforms to move towards e-processing (contactless procedures), recognition of digital support documents (paperless procedures), and to emit permits and authorizations via digital platforms. Such a strong push would not have happened without the pandemic, and some consider such an evolution one of the few positive sides of response measures taken. Such a shift can be seen in fisheries and environmental agencies but also in customs authorities, particularly with respect to trade in essential products such as food and medicines (e.g., in Costa Rica, Belize and Barbados) (UNCTAD, 2020d). This process needs to be deepened and supported as it can allow for public services competitive gains, lower costs for business in developing countries and lower probability of illegal fishing and unethical behaviors.

Public sources for ocean-oriented finance need to be expanded. Until now, the bulk of capital deployment towards a sustainable ocean economy comes from governmental commitments, actively promoted through ODA. As a first step, it is essential that all donor countries live up to the pledge they have committed and increase ODA to the 0.7 per cent of GDP level. A second step is to significantly increase the share devoted to the ocean economy – not only because ocean-based sectors such as fisheries, tourism and maritime transport are at the heart of the economy for many developing countries (OECD, 2020a) but also because the ocean is at the heart of a sustainable planet. The OECD's efforts as part of its Sustainable Ocean for All Initiative to develop a coherent taxonomy for defining and measuring this is extremely useful in this direction.

Public banks – towards a new blue bank? Public banks and development banks have gone from being deeply criticized in some quarters (even as some of the most critical countries continued to use them), to an essential institution for governments across the globe, in developed as well as developing countries. Some development banks in ocean driven economies and regions incorporate certain marine activities as part of their business. However, they are not treated as a particular category; similarly, some of the big new Southern-led banks such as the Asian Infrastructure Initiative or the New Development Bank have an infrastructure focus and favor renewable and green investments that can impact the ocean economy, but none if any have yet identified a specific blue ambition, even though their member owners are often deeply embedded in and impacted by the ocean economy. Similarly, the new public banks started in the advanced economies after the economic crisis of 2007-2008 have a green mandate only. Perhaps now it is time for either a blue bank, or blue experts within green banks. Certainly, the growth of interest in blue bonds signals there is the start of an appetite for this, and it is important to harness this with activities that are sustainable as well as ocean-related and not "blue-washing" (see Barrowclough *et al.,* forthcoming, 2021). Given the extremely important contribution that the ocean economy

makes to the global economy, it is surprising this has not been mooted before, but the time is propitious now as there is growing appreciation of the special challenges and understanding that ocean activities require finance on the part of financial experts as well as businesses and trade, and potentially some interest on the part of philanthropists and some impact investors.

Make use of Blue Public-Private finance. At the same time, a public blue bank and indeed its government owners will likely want to engage with the private sector, and private capital will be needed alongside public finance in order to provide the scale of investment needed as well as important managerial, technological and market capabilities. As shown above, at one level there is a huge potential that could be tapped, however at another the finances are not going to where they are needed. The challenge as ever is on what terms governments, blue banks or even philanthropists in the ocean economy engage with the market. Governments are under a great deal of pressure to "de-risk" for the private sector – or rather, to take on the risk themselves. However, the evidence from decades of Public-Private Partnerships is not at all encouraging on this.

Having focused and dedicated blue public banks can potentially help improve the interface between public and private finance, if it can direct private finance towards productive investment and not leave the public role as simply the bearer of risk. The need for this is evident in the current literature on blue investment, much of which is written from the perspective of asset managers and owners, examining the potential for the ocean to be an important asset class (e.g. Credit Suisse, 2020), and investor surveys find high levels of interest in the area but self-confessed low expertise. Sectors identified include marine renewables, marine biotechnology, efforts to reduce plastic pollution, and sustainable fishing and aquaculture. These could, in principle, be sources of finance for the ocean economy to try to tap. However, at the same time, the broader experience of nature as an asset class highlights many problems which are seen not as unusual blips but rather inbuilt flaws that are inherent in the system.

Improve regulation of Blue Finance. Whether public or private, blue or green finance there needs to be more clarity and consistency on ESG criteria, monitoring and regulation.[15] This is occurring now in the green universe, with debate about Green Bond Principles (GBP) and Green Loan Principles (GLP), amid claims of "greenwashing"; "blue washing" will no doubt follow. Discussion is taking place in the context of the Sustainable Blue Economy Finance Principles, co-created by WWF, the European Commission, the European Investment Bank and the World Resources Institute (Planet Tracker, 2019 and FAIRR, 2019), and the UN Environment's new Sustainable Blue Economy Finance Initiative and further research is needed about their impact and effectiveness for governments, owners and managers alike.

Time for a Blue New Deal. All of these suggestions can be seen as a call for a Blue New Deal, as sister to the Green New Deal already gaining political support and traction around the world (Barrowclough *et al.,* forthcoming, 2021). As always, the first argument will be that there is no money to pay for the investments implied, however this is not the case. One source alone could be to shift fossil fuel and harmful fish subsidies, as part of wider efforts to invest in SDG 14 implementation. Fossil fuel subsidies (for both consumption and production) have been estimated at about $ 345 billion in 2020 (IEA and OECD, 2021) and harmful fish subsidies at above $20 billion worldwide (Sumaila *et al.*, 2019). While there

[15] The newly created Ocean Risk and Resilience Action Alliance (ORRAA) led by global insurer AXA XL and ocean advocacy group Ocean Unite is supported by all G7 members, as well as Fiji, India, Mexico, and Norway. It focuses on addressing the risks occurring from ocean degradation and the need to invest in coastal and ocean resources.

have been important reductions in fuel subsidies over the last two years due to decreases in oil prices and lower fuel consumption, these subsidies still are very important. Such public resources could be allocated to finance a new blue deal worldwide, based not only on a blue bank but also other policy and financial instruments that encourage stock and ecosystem management, improve traceability and compliance with sanitary measures for blue products, enhance safety and social protection of crews and coastal workers, enable sustainable coastal and marine ecotourism and support alternative livelihoods of economic activities of small scale fishers and coastal populations. Additionally, phasing out fossil fuel and harmful fish subsidies will directly contribute to climate change mitigation by reducing fuel consumption and GHG emissions in support to the implementation of the objectives of the Paris agreement and to improve the sustainability of stocks worldwide.

A global oceans public forum. While the 2019 OECD initiative is a very welcome step to bring together many different aspects of the sustainable ocean economy and to highlight its particular challenges and opportunities, this needs to be further supported by institutions that include developing countries as members so that all can have a voice. Action and support by UNCTAD, the UN Compact, FAO, UNEP and the South Centre could be particularly relevant here. Similarly, important actions are being taken by individual states, such as the governments of Fiji-Sweden, which co-hosted the first sustainable Blue Economy Conference in Nairobi in 2018; and Kenya-Portugal which would co-host the second UN Oceans Conference to be held in 2021 in Lisbon. It is essential for developing countries to seize this important moment.

Technological and managerial innovations have contributed to securing the continuity of marine value chains, reducing the risk of infections and ensuring the continuity in the provision of goods and services in the ocean economy, from incorporating technologies that allow the disinfection of materials and goods to marketing innovation through using social media to commercialize artisanal fisheries products and promoting digitalization in the tourism industry. This highlights several issues including the importance of access and affordability of relevant technologies and the opportunities that enable connectivity to the internet. Benefiting from the opportunities provided by technologies not only depends on access to innovations but also on having the capacities to reap the opportunities they offer. This highlights the importance of equipping the different stakeholders participating in the ocean-based economies with the relevant skills that allow them to benefit from digitalization and new technologies. The importance of capacity building is particularly relevant when considering technological innovations that support the sustainable use of marine resources. Successful transfer of these emergent technologies requires not only the successful availability of the hard technologies but also the availability of skills for the use, maintenance and problem solving.

UNCTAD's 2020 ocean-based sector classification could be a useful benchmark to match tradable goods and services with relevant technologies and patent categories under WIPO's International Patent Classification (IPC). To have specific patent classification is not new in the environment field. There is for example the IPC Green Inventory, which facilitates searches for patent information relating to Environmentally Sound Technologies, as listed by the UNFCCC. A similar exercise could be undertaken for marine technologies with the support of and technical expertise from UNCTAD, the United Nations Division for Ocean Affairs and the Law of the Sea (UNDOALOS), FAO, UNEP and the South Centre. Such an exercise will allow to better understand patent filing and granting trends in existing and emerging marine technologies, whether embodied in goods or delivered through services and know how. It can also serve a tool to explore options to implement existing or future clauses on transfer of technology under the law of the sea, particularly in relation to patented technology. For example, Chapter V on capacity building and transfer of marine technology in the draft United Nations Treaty on Biodiversity in Areas Beyond National Jurisdiction (UNGA, 2019) presents a unique opportunity to develop effective and

implementable state of the art clauses and implementation systems on transfer of marine technology.

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