

A Global Perspective on Our Progress in Striving and Striding towards A Sustainable Blue Economy Future for Our Earth and Oceans: AN Overview of Various News, Trends and Developments as of May 2021

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Blue Economy Future

Blue Economy Future operates a specialised consultancy service. Our approach is to empower human potential through active inclusive stakeholder engagement; results driven research that strives to be practical with meaningful, engaged outcomes. We focus on practical awareness, identifying climate change, blue, green and circular economy opportunities and finance, training and entrepreneurship approach through all stages of a project; including monitoring and evaluation whilst being accessible; focusing on empathy. Blue Economy Future extends beyond just offering traditional consulting and project management services to facilitating entrepreneurship and courses, devising curriculums and manuals; policy advice, implementation, increased fund-raising, facilitation and awareness of news, events, initiatives and opportunities. It has established a significant global network and series of partnerships. Our sustainable, climate change, environment, green and blue economy experience extends to the legal, laws, policies, socioeconomic, events and latest technological/knowledge updates with work experience in a variety of ocean/blue economy areas. These include ocean governance, illegal and unregulated fishing, undersea exploration, marine protected areas; marine renewable energy; ocean governance and sovereignty/maritime law, ocean pollution reduction and the circular economy, small harbours, marine renewable energy, to cruise and marine tourism to biotechnology entrepreneurship, education, business, drones, ship repair, digitisation, actual blue economy strategies, space economy, maritime law, ocean governance, logistics, blue economy finance and psychology. Recent project examples include Durban's Blue Oceans Economic Strategic Framework, advising on current global and South African ship repair markets and a socioeconomic valuation of the sector, risks and opportunities of the Benguela Current Region for the Benguela Current Convention (Namibia, Angola and South Africa). Others include monitoring and evaluating the Durban Oceans Champs/Durban-Bremen Marine Environment Education Network and advising on the implications of the 4th Industrial Revolution for maritime education and training.

The approach that Blue Economy Future follows is based on sustainability, inclusivity, optimizing potential and integration. Sustainable development refers to the economic development that is both inclusive and environmentally sound, and to be undertaken in a manner that does not deplete the natural resources that societies depend on in the long term. The need to balance the economic, social, and environmental dimensions of sustainable development in relation to oceans, land, ecosystems is a key component of the transition towards a climateproofed future and climate resilient sustainable land, ocean and marine livelihoods, communities and ecosystems and circular economy, zero-waste future. It is an approach that aims to ensure long term optimal survival, maximizing the technological innovations of the Fourth Industrial Revolution, harnessing individual and collective human ingenuity, sustainable finance and creativity for greater local and global prosperity.



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Introduction: The Global Blue Economy

Humanity stands at an abyss. The next few years will quite simply determine whether our species, our ecosystems and our planet survive the problems that our species is solely responsible for and that climate change has accelerated. We have to coordinate our efforts, understand and accelerate our progress in saving our world. Whether chronic excessive overpopulation and resource pressure growth, anthropogenic climate change; the surge of pollution, illegal, underreported and underregulated fishing, wars, pestilence, mass migration, species biodiversity and loss, pestilence, epidemics such as the COVID19 pandemic, natural disasters, climate related events, our own apathy, social, economic, ecological, political, religious, cultural, psychological and other soaring catastrophes that prove to be the need for immediate action; there can be no denying we face many challenges. Globally, interest is surging in the potential prospects of the ocean, the rivers, waterways and all aspects... that the blue economy and ecosystem can save us all.... Provided we can save it...

Maritime supply chains and stakeholders contribute over 90% of international trade. The United Nations (UN) recognise that ocean assets are valued at over \$24 trillion. More government stakeholders, organisations and individual stakeholders wish to benefit from the projected growth from US \$1.5 trillion in economic activity and 31,000,000 direct jobs to over \$3 trillion and 45,000,000 jobs between 2010-2030. Many of my previous projects and efforts have publicised how we can make progress in every single aspect of the blue/oceans economy; how it offers hope and opportunities with its entrepreneurs; its ecosystems of vast treasures, its spiritual sustenance; the ever proliferating sources of funding, ideas and opportunities can save us in a variety of ocean/blue economy areas if we concentrate on marine protected areas accelerated as much as possible. These include ocean governance, illegal and unregulated fishing, undersea exploration, marine protected areas; marine renewable energy; ocean governance and sovereignty/maritime law, ocean pollution reduction and the circular economy, small harbours, marine renewable energy, to cruise and marine tourism to biotechnology entrepreneurship, education, research, seabed mining business, drones, ship repair, digitisation, actual blue economy strategies, space economy, maritime law, ocean governance, logistics, blue economy finance and psychology.

Yet too many of us operate in silos without realising just how much we need to understand, be aware of and coordinate to the multiple developments of other sectors. When we hear the news, it is too easy to get despondent and fear that we truly are not making any progress. Nor can we learn from and benefit from the developments out there, if we do not know what they are. Nor can we rally behind worthy causes; benefit as consumers from growing technological and product innovation or yield any other benefits if we truly do not know the developments in many countries and blue economy areas. Admittedly, it would be ambitious to cover every area and section, but even a brief insight can further help us to grasp a more common and global perspective on the many pathways and trends guiding our destiny. It can aid not just policymakers but us all to be truly aware of what is going on in different sectors, but also globally, nationally and regionally among various stakeholders. After all, we have to live in the world they are shaping and imagining. As humans, we deserve to at least know about it -and if many of us can contribute to implement further progress -even better! Hence, the brief objective of this paper is to provide an update into further developments in the blue/oceans sector as of May 2021 CE. It focuses both on different blue economy sectors and stages in Section 2, then regionally and for individual nations in Section 3. It therefore aims to guide and empower those with an active interest to become more actual participants.

Section 2: Emerging Ocean/Blue Economy Trends and Developments

Global and local policies towards the blue economy are being spawned by an ever increasing number of initiatives such as the ISA policies, Blue Prosperity Coalition and UNESCO MSP Initiative, UN Decade of Science, Mozambique's Pro-Azul Strategy, the Benguela Region the AU Blue Economy Strategy, IUCN's ESARO Strategy, Operation Phakisa, Commonwealth Marine Economies Programme, Horizon 2020 including MARIBE, NEXUS, Blue Economy Platform, UNEP's Sustainable Blue Economy Finance Principles, World Bank's PROBLUE and the Blue Need Programme. Increasingly various blue economy projects are being undertaken or attempted including the Indian Ocean Rim Association tender to study blue economy and coastal cities in East Africa. The World Bank cancelled a tender for North Africa's blue economy, investigated Vietnam, India and Guinea along with Pro-Azul for Mozambique and are advertising options for the Caribbean in 2020. The International Labour Organisation and African Development Bank are considering it for Madagascar. South Africa created the Durban Blue Oceans Economic Framework, the first southern hemisphere city level strategy. It also placed a tender for the Northern Cape region, whilst the Benguela Current Commission are similarly conceptualising the ocean economy. The private sector, investors and associated governments are considering other opportunities. This report does not provide an extensive detailed discussion of these policies and developments, it merely indicates what they are so that stakeholders may be more conscious of them, to self-identify and determine which resources, trends and

developments they may wish to find for themselves as part of my and Blue Economy Future's movement vision to accelerate the implementation of the blue/oceans economy and a sustainable prosperous future.

2.1: Fisheries

On April 22nd Pakistan announced a programme to extend microcredit to fishermen across the nation. Greenland and the European Union pledged to a more sustainable fisheries agreement on 23rd April 2021. The European Commission members endorsed France's proposal to allocate the fisheries sector 100,000,000 euros to aid COVID19 recovery through covering fixed costs for forced mooring of fishing vessels, compensation for loss of access to waters under BREXIT and a scheme to compensate fishmongers and processors across the supply chain. Morocco with its Mohammad I and National Fisheries Institute committed to a research partnership with the UNFAO and General Fisheries Commission for the Mediterranean. Saudi Arabia and Mauritius also signed an agreement on fisheries access and cooperation. The Seychelles became the first global nation to submit a report and publicly implement the first Fisheries Transparency Initiative report. In Kenya the government terminated a 1,000,000,000 Kenyan shilling Liwatoni Fisheries Complex project under the basis of corruption. More concernedly, the Maldives are investigating the repeal of a 10 year ban on shark fishing.

2.2: Aquaculture

The US Congress faced industry pressure in March via a mobilisation effort titled "Essential Aquaculture," Stronger America Through Seafood (SATS) In April 2021 the Global Aquaculture Alliance announced how individual entrepreneurs and companies such as those insect based (Ynsect) and others such as Cargill were aiming to reduce the carbon footprint of their feed and other operations dramatically. A study on the Fish Site source indicated how possible plans by the Iranian government to expand Persian Gulf cage aquaculture might threaten the region's coral reefs. Undercurrent News reported that Iceland's food administration Matvaelastofnun, unveiled a new aquaculture statistics dashboard. Intrafish hosted its pioneering Aquaculture Innovation Summit from 20th-21st April 2021.

2.3: Marine/Blue Biotechnology

Our progress in marine/blue biotechnology may aid us in myriad areas from extending human and species health to cosmetics, food security, textiles, building materials and even more resilient variants to climate change and ocean acidification. Bluu Biosciences received \$8,200,000 in crowdfunding to investigate generating Europe's first cell cultured fish. On 25th April 2021, scientific researchers announced the cultivation of corals including germinating cells from the stony coral, *Acropora tenuis*, in petri dishes. Arielli Capital launched a specific Israeli based alliance to develop finance and research collaboration support for the Israeli marine biotechnology community. The European Submariner Network launch an MSP and the Baltic Blue Bioeconomy webinar on the 27th April 2021.

2.4: Ports

In January 2021 San Diego port announced its 9th successful incubator project to support local entrepreneurship since founding the Accelerator in 2016 as few ports comparatively undertake globally. In March 2021 Greece announced tenders for the modernisation of Crete's Heraklion port. Portugal's port of Leixos aims to be the first carbon neutral European shipping port by 2035 including in shore electricity. In the United Kingdom they are finally introducing to Europe the concept of drone medical delivery which Rwanda successfully pioneered in 2015 to compensate for comparatively poor rural infrastructure. In April 2021, Project Medidrone will supply Covid19 tests and other medical supplies to offshore vessels at Montrose port using the drone operator HEROTECH8, insurer Flock and technology firm Neuron. To resolve the massive congestion issues and high inefficiency that have hindered South Africa's port throughput since 2014, on 22nd April the port authority Transnet and the government, once more committed to another \$7 billion of port modernisation and expansion. Contecon Guayaquil (CGSA), International Container Terminal Services Inc as a port operator, the Guayaquil port authority and government all announced the establishment of a new Exclusive Economic Zone.

2.5: Shipping

On 25th April 2021 the International Chamber of Shipping Secretary General publicly expressed a need for a global carbon tax that would incorporate shipping. The American Bureau of Shipping (ABS), DNV, Japan's Maritime Bureau, Ministry of Land, Infrastructure, Transport and Tourism (MLIT), Lloyd's Register (LR), Nippon Kaiji Kyokai (ClassNK), the Norwegian Maritime Authority (NMA), and the UK's Maritime and Coastguard Agency (MCA) announced the joint partnership and launching of the Maritime Technologies Forum. This would have a twofold aim of accelerating research and deployment of technological innovation, whilst systematically adapting to regulatory requirements that mandated the usage of such innovations. COVID19 has created unprecedented innovations and challenges such as both the Liberian and Panama Maritime Registries permitting remote vessel inspections, most recently in India as a response to the escalating death rate of over 300,000 cases per week in that country. MSC announced a new shipping route between the USA and Vietnam.

2.6: Decarbonisation, LNG, Ammonia and Hydrogen

Clarkson Research Services released a 2021 report indicating that shipping decarbonisation was estimated to cost around US 3.4 trillion dollars, with \$2.19 trillion needed to replace existing fleets and a further \$1.2 trillion to adapt to forecasted shipping demand growth. The American Bureau of Shipping, Singapore's IAP and the World Bank also recently publicised shipping decarbonisation reports, the latter advising urgently avoiding LNG in favour of ammonia and hydrogen. In another report the Institution of Mechanical Engineers estimated that up to 40% of emissions could be avoided in certain vessels, if we were to revert back to using customised sails harnessing wind power. In April 2021 the USA reversed its previous position and indicated it would support active efforts by the International Maritime Organisation to achieve a global target of 50% emissions reduction by 2050. The UK just introduced shipping emissions into its Carbon Budget for the first time, in recognition of their significant contribution to climate change. Japan's shipyards recently completed an LNG fuelled Karmasax bulk carrier and ammonia fuelled a very Large Crude Carrier. The Stene Bulk shipping line announced plans to achieve 100% emissions reduction by 2050.

Other contemporary developments include the April 2021 conversion of Norway's first LNG bunkering vessel in partnership with Bergen Tankers and Hoglund Marine Solutions. Malaysia's Petronas firm are accelerating their ambition to be a regional LNG bunkering and distribution hub across Southeast Asia including expanding exports to China. Following costs, technological uncertainty and the congestion consequences fiasco of the Ever Given

blocking the Suez Canal for 6 days, Shell paused its original plans for a 600,000 ton, \$12 billion floating LNG barge. They are investigating hydrogen fuel cells for ships in Singapore. The European Commission is sponsoring the Flagships EU project including a \$5,000,000 euro pallet shuttle barge along the Parisian Seine River as the first European inland waterway commercial vessel. The organisation Energy Observer and shipping corporation CMA CGM are aiming to undertake the first global voyage entirely powered by hydrogen. Penguin, Shell and Sembmarine are aligning with each other to experiment sea trials on a hydrogen powered Ro-Ro vessel.

2.7: Climate Change and Oceans

Climate change is creating unprecedented pressures on Earth's land and oceans as confirmed by ever increasing scientific research. The April 2021 release of the World Meteorological Organisation's State of the Environment Report indicated how extreme events are creating unparalleled impact costs. 80% of the oceans experienced at least one marine heatwave, while record heat accumulated in the seas, which absorb 90% of heat resulting from human activities. Other findings included:

- Sea ice in the Arctic reached its second lowest minimum on record, while hundreds of billions of tonnes of ice were lost in Greenland and Antarctica, helping to push up sea level.
- Severe flooding hit large parts of Africa and Asia, helping trigger a locust plague in the Horn of Africa.
- Extreme drought affected many parts of South America in 2020, with the estimated farming losses near \$3000,000,000 in Brazil alone, with further losses in Argentina, Uruguay and Paraguay.
- The largest wildfires ever recorded burned in the US, while Australia broke heat records, including a temperature of 48.9°C in western Sydney.
- The north Atlantic hurricane season had its largest number of named storms on record with 30, and a record 12 made landfall in the US.
- Cyclone Amphan hit India and Bangladesh and was the costliest tropical cyclone on record for the north Indian Ocean, while Typhoon Goni which crossed the Philippines was one of the most intense cyclones ever to hit land.

An April 2021 study by University of New South Wales Climate Change Research Centre academics indicated that ocean current energy expanded by over 5% every 10 years from 1993 to 2020. This accumulative pressure will not only influence ocean circulation, associated sea surface temperatures, energy patterns and species migration but may accelerate the pace of global climate change itself. A recent Chinese Academy of Sciences article by Shanshen Deng and others indicated the cumulative loss of hundreds of billions of tons of melting sea ice may have even helped precipitate the moving of the tilting of the Earth's axis by 13 feet since the mid 1990's and the North and South Poles to shift eastward. In failing to commit to climate change reductions at a US President Climate Summit, Australia faced political pressure and instead pledged to devote \$19,000,000 to restoring its own marine wetlands/mangroves/coastal ecosystems, \$10,000,000 to other Pacific nations and \$1000,000 towards a national blue carbon accounting system, all believing in blue carbon resilience to buffer the full effects of climate change. Space X founder and noted entrepreneur Elon Musk is committing a \$100,000,000 prize competition seeking radical climate change solutions in response. The World Ocean Council as a private sector initiative continue to host monthly Roundtables to explore radical climate change reversal and ecosystem solutions, linking some of the global pioneering entrepreneurs.

2.8: Illegal, Unreported and Unregulated Fisheries

IUU Fisheries is expected to cost between US \$17-23 billion each year globally in direct costs according to the UN Food and Agricultural Organisation (FAO). Over 34% of all global species are heavily overfished and threatened with collapse or extinction including all popularly consumed species such as sardines, tuna, mackerel, herring, cod and others. If ever there was a reason to act, imagine a world where these were to disappear... Certain regions are affected worse than others such as up to 25% of the South Pacific's catches are lost to illegal and unmonitored activities. Up to 20% of global harvested catches and consumed products are estimated to be illegally fished. Other recent developments related to IUU fisheries includes the 2020 attempted efforts to strengthen ocean governance and responsibility via a new UN High Seas Treaty for areas beyond national jurisdiction to update the 1982 UNCLOS Agreement. It extends to the recent December 2020 attempts in a World Trade Organisation Agreement to reach a greater global commitment to phase out fishing subsidies, creating perverse, market distorting incentives, overcapacity and accelerating economically marginal seafood prices for many species such as tuna. In 2018, global fishing subsidies exceeded \$35 billion each year. However, agreement ended up being postponed. The activist organisation Sustainable Ocean Alliance along with multiple NGO's launched online campaigns and mass media efforts, given physical COVID19 pandemic restrictions in an effort to draw global attention and pressure to this issue.

Recent technology solutions including unprecedented levels of sensors, satellites, drones, Internet of Things, seafood traceability and labelling schemes, sustainable online marketplaces and other directories/initiatives and solutions offer ever greater capacity to assist fisheries enforcement stakeholders, concerned organisations, individuals and legitimate businesses, all continuously facing prospects of ruin or burdens from this onslaught to their efforts. Greater deployment of technology may be able to also reduce pressures faced by traditional methods of fishery observers and a comparative handful of patrol vessels and crew. Open Ocean Robotics are pushing Robo-Cop as an autonomous drone solution since October 2020. In September 2020 Indonesia launched a new Maritime Information Centre and Morocco invested in Atlan Space satellites. For example in November 2020 Australia deployed 5 hydrophones. In the same month, The Indian Space Research Organisation (ISRO) and French agency CNES (National Centre for Space Studies cooperated to form the basis of a more sophisticated maritime security and surveillance network for the Indian Ocean. The European Union are involved in Smart Fish H2020 in collaboration with Sintef Ocean, using Smart Gear with species sensitive LED's to reduce bycatch, concentrate only on selected species US Agency NOAA has also committed US \$12,700,000 to investigate autonomous law enforcement drone solutions in 2020 and signed a partnership agreement with USAID to cooperate over IUU fisheries.

Since then, in January 2021 the UK invested another 32,000,000 pounds in further patrols and aerial surveillance to its Marine Management Organisation on the subject. US authorities issued a report indicating that over US \$2,400,000,000 of illegal seafood was imported in 2020. In March 2021, Indonesia sank 8 Malaysian vessels caught in the act. China is imposing and intensifying a commercial fishery ban in the Yangtze River facing 5000 years of unmanageable plunder. In the past three months, fishery authorities along the Yangtze have destroyed 3,437 boats, cleared 37,255 illegal nets, investigated 1,834 cases, and seized 464 boats and 1,955 people involved in illegal fishing. The 2020 release of Outlaw Ocean as an influential book and the Netflix Seaspiracy film documentary are exposing the sector, unprecedented in its history, for the evident abuses and costs.

2.9: Marine Pollution, Waste and the Circular Economy

On 26th April 2021 USAID and the government pledged additional funds to the Sri Lanka government as part of the Clean Seas Blue Ocean program to reduce marine waste, beyond an initial \$345,000. Germany, Vietnam, Ecuador, and Ghana agreed to work with the United Nations Environmental Programme to host a Ministerial

Meeting in September 2021 to discuss a common solution to this impending problem. Vietnam is additionally investigating marine plastic credits and payments to reduce litter as incentives. Recent research is further confirming the problems of face masks and other related litter spanning from the COVID19 pandemic which needs separate recycling facilities as medical waste, the strings cut off to prevent species entanglement, separate isolating for 72 hours to decontaminate risks of COVID19 before recycling or the even worse alternative of landfill, just to avoid it being a problem. The private sector continue to produce innovative solutions such as Yve Bourgnon's Manta -the first plastic/other waste scooping catamaran with capacity to eliminate up to 3 tons per day from the waters. Others are embracing the concept of waste reduction and the circular economy such as Natural Evolution, Madiba and Nature and others.

2.10: Seabed Mining

Norway called for public consultation in an effort for its Ministry of Petroleum and Energy to open up its domestic oceans to mining in January 2021, despite active opposition by local environmental groups and the World Wildlife Fund. Yet on 29th March, Green Minerals, the deep-sea mining arm of Cyprus-based Seabird Exploration, is set to collaborate with a consortium led by Oil States Industries, a subsidiary of oil service firm Oil States International to investigate seafloor mining in Norway around 2026. In March 2021 Google, Samsung, Volvo, BMW and WWF all called for a global moratorium on seabed mining due to highly uncertain ecological and socioeconomic risks. Deep Green Metals are partnering with Glencore and Allseas to send an AP Miller Maersk vessel to investigate mineral extraction around Nauru, Kiribati and Tonga. The Cook Islands government and opposition parties recently spurned civil society calls for a 10 year moratorium on the controversial exploration and commercial exploitation of cobalt and polymetallic nodules. On the 25th April Greenpeace launched a nationwide protest on seabed mining. Although Oregon banned underwater mining as early as 1991, Washington State in the USA just ratified a similar proposal in its Legislature on 12th April 2021. On 22nd April 2021 Greenpeace renewed efforts to call for a permanent New Zealand ban. The European based Mining Impact Research project partnered with the private corporation GSR to collect nodules via the Patania II for up to 50 hours in the Pacific Ocean Clarion Clipperton Zone.

2.11: Offshore Oil and Gas

The offshore oil and gas seismic equipment and acquisitions market is expected to grow by USD 1,650,000,000 during 2021-2025, according to a market industry analysis conducted Technavio. In the most disturbing news of how allowing insurrections can destabilise formerly productive sectors with significant promise for ocean industry; France's Total are completely withdrawing all operations and evacuating all staff in declaring force majeure and abdicating on the Cabo Delgado offshore LNG project. ISIS insurgents completely threaten the Afungi Peninsula. Australia is strengthening their decommissioning framework and process to ensure former operators follow more stringent standards when ending projects, with greater liability. More evident public engagement will also be required. Under government pressures to curb emissions, Equinor claim they wish to remove up to 1000,000 tons of emissions in exploration and production each year by 2025, in relying upon shore based electrification and energy supplies from renewable energy sources. Environmental activists and the Chair of the UK Climate Change Committee Lord Deben critiqued a recent UK decision that permitted new North Sea offshore oil and gas projects as long as they pass the vague statement: "they can pass a "climate compatibility" test, to establish whether it is compatible with action to tackle the Climate Emergency. This is notwithstanding UK government pledges to significantly reduce emissions

2.12: Marine/Ocean Renewable Energy

From January to March 2021, Barbados appointed ITP Energised consultants to investigate the feasibility of floating and fixed offshore wind energy and Ocean Thermal Energy Conversion technology as part of its renewable energy targets. At an April US Climate Summit the US government, President Joe Biden and the Department of Energy publicly committed to over 10 GW of energy supplied by offshore wind farms by 2030 -enough to provide consistent electricity for 10,000,000 households. From the 13th April 2021, Marine-I, the Isles of Scilly Community, Waves4Power and Planet A Energy are looking to investigate the UK Isles of Scilly and their technical feasibility for ocean energy projects. A report by Wartsila estimated South Africa needed over 28 GW of energy, suggesting partly that offshore marine/ocean energy could rapidly accelerate part of the difference needed.

In the private sector OPRC USA and OPRC Ireland are investigating a \$3,900,000 project to commercialise offshore marine energy turbines in Ireland. Magallones Removables reinstalled a 2 MW tidal energy prototype on 19 April 2021 at the Fall of Warness experiment facility at Orkney, Scotland. In Chile Enel Green Power Chile and Ocean Power Technologies (OPT) have installed the PB3 PowerBuoy wave energy converter off the coast of Las Cruces in Chile to investigate the feasibility of wave energy power in its first trials. Sembmarine and GE Renewable's Energy Grid Solutions obtained a 600,000,000 pound UK government contract as part of the Sofia offshore wind farm project. This aims to provide 1.4 GW of electricity to empower over 1,200,000 homes in one of the largest global installations planned at present.

2.13: Cruise, Marine and Recreational Tourism

In April 2021, Ireland announced 19,000,000 euros worth of funding for recreational and coastal tourism across 22 facilities. A marine biologist also devised a whale tracking app in the country, to promote sightseeing cruises. In Central America the La Cruz Coastal Tourism Corridor is being developed with Costa Rica and Nicaragua. In the Caribbean Dominica are developing La Romana as a hub port for cruise vessels. South African ocean economy stakeholders are developing the Blue Cape partnership to further develop Western Cape tourism's potential. Australia are planning to allocated \$1,400,000 to aid Sunshine Coast tourist facilities to recover from the COVID19 pandemic. Vietnam are actively seeking to expand marine tourism as part of their blue economy. Under the COVID19 pandemic, Singapore are adapting by offering cruises to nowhere. Yet whilst several cruise lines were looking at resuming operations in the Northern Hemisphere summer in July on April 26th the US Senate just blocked a Careful Resumption Under Improved Safety Enhancements (CRUISE) Act.

In conscious recognition of the threats on sustainable visitor pressures, the NGO Reef Check in Malaysia documented 41.3 % of 210 sites were only in a fair condition, the rest had been heavily threatened by pollution, climate change and increasing tourist numbers. Commercial tourism is also threatening Cambodia's Ream National Park according to online source China Dialogue with massive Chinese based tourism resort development concessions in partnership with the government, in violation of ecotourism objectives and the blue economy. Thailand are investigating saving the vaunted Maya Bay which appeared in the film -The Beach," from an influx of mass tourism pressures on fragile ecosystems. Equally the Cayman Islands, Alaska, Maine and Venice to curb the numbers of tourism visitors. In Alaska's case, this was 1,500 per day for a vessel for Juneau, which effectively excludes mega ships.

2.14: Maritime Research, Innovation, Education and Digitisation

On the 26th February 2021 announced the Inaugural Ocean Economy Skills Summit in South Africa. The UN recently announced the release of its second World Ocean Assessment report. The Commonwealth Secretariat are announcing a 10,000 pound prize on using satellites to solve one of 10 ocean challenges by the 31 May. Rhode Island are investing in a state Blue Economy Accelerator. In the UK, the state is installing the Global Ocean Wildlife Analysis Network for greater understanding of marine biodiversity, ocean health and coastal/marine ecosystems. On 22nd April Stamford in the USA announced a \$11,000,000 beach restoration and Maritime Education Centre project. Singapore is establishing a Maritime Decarbonisation Centre in support with shipping and registration companies. The Bahamas Maritime Authority are planning to investigate the health and wellbeing of seafarers as affected by the COVID19 pandemic.

2.15: Entrepreneurship

In January 2021 the EU Blue Invest committed 45,000,000 euros to support entrepreneurship. The private sector are hosting unprecedented events and opportunities to develop entrepreneurship and support funding. For example the World Ocean Council have just pioneered the Global Blue Entrepreneurship Innovation Network linking funders with entrepreneurs, accelerators, incubators, competitions and other resources on a monthly network initiative. Continuous funding rounds from over 140 organisations have been identified by the Council and a similar initiative by Duke University. Additional upcoming events include the 2021 Ocean Week on the Role of Data in Saving the Ocean on 4th May, the 18th May 2nd Round of funding by Washington Maritime Blue, the next round by Ocean Hub Africa for June, continuous efforts by Sustainable Ocean Alliance and others. Global capital and finance is also being mobilised such as the UNEPFI, WWF and BNP Paribas hosted webinar event on 6th May. Blue Ocean Leading Drivers (BOLD) and Moonshot announced a partnership in creating a software platform to form an innovation ecosystem landscape.

2.16: Marine Protected Areas and Conservation

In January 2021 France committed a new strategy to protecting 30% of oceans by 2030. On the 21st April 2021 Minderoo Foundation, Ocean Unite, Conservation Alliance, Global Environmental Facility and others committed to launching the Blue Nature Alliance. This pledged to safeguard over 18,000,000 square kilometres of ocean around Fiji's Lau Seascape, Antarctica's Southern Ocean and the archipelago of Tristan da Cunha in the southern Atlantic Ocean. Australia's government committed \$100,000,000 to ocean protection including \$30,000,000 towards ecosystem restoration, \$40,000,000 for existing marine parks, \$11,600,000 towards 9 indigenous areas and \$18,000,000 towards marine biodiversity and more sustainable fisheries including \$5,000,000 to specifically deal with ghost and other fishing gear related problems. To protect the integrity of Baltic Sea ecosystems, Romania banned harvesting of wild sturgeon. The South African Oscar winning documentary My Octopus Teacher even more visually appealed to people to conserve and learn from other marine species.

Section 3: Regional Blue Economy Strategies

3.1: Europe and the Mediterranean

In 2007 the EU launched an Integrated Maritime Policy, followed by a Blue Growth Strategy in 2012. The blue economy presents more environmentally sustainable and climate resilient possibilities to climate change consequences as an increasing investment and policy priority, although seldom directly linked to risks and opportunities for the Mediterranean (MAVA, UNEP and Plan Bleu 2016; Union for the Mediterranean 2016, WWF 2017). In 2017 the EU blue economy was estimated as currently creating over 658 million euros in turnover and supporting over 4000,000 jobs (European Union 2019). The Mediterranean marine ecosystem is worth over US \$5.6 trillion in related services (WWF 2017). Fisheries alone employ over 180,000 people and contribute over \$3 billion. In Cyprus the blue economy supports over 623,000,000 in revenue and 20,000 jobs across coastal tourism, ports, ecosystems, fisheries, shipping, shipbuilding and repair and other activities. For Malta it supports over 344,000,000 in revenue and 12,700 direct jobs. Malta has also created an Integrated Maritime Policy to expand upon this further (Integrated Maritime Policy 2014). As with other Mediterranean islands, it has pioneered efforts in aquaculture, biotechnology, marine renewable energy, coastal tourism and fisheries but yet to interlink it with climate change adaptation to simultaneously address both risks. Other sources are developing maritime clusters, to harness prospects in these areas but these invariably neglect climate change (Union of Mediterranean 2019). Sources frequently allude to lack of a popular awareness or risk concern but the need for sustainable development and fiscal or other incentives

The Panorama Strategy aims to further scale up initiatives to benefit from international partnerships with Japan, Norway and BRICS. Europe pioneered this with the 2012 Blue Growth Strategy for smart, inclusive growth. The Mediterranean have launched the BLUEMED Initiative to maximise related employment, centralise information and form a joint stakeholder contact network (UNEP 2016). The blue economy extends to over 600 ports, 1 billion euros in marine biotechnology; 90 billion in port revenue and 550,000 direct related jobs. The source especially includes fisheries, tourism; maritime transport, infrastructure, renewable energy, biotechnology and seabed mining. It focuses on connecting previously separated economic activities and research areas, strengthening education and effective environmental governance, closely aligning objectives to the UN Sustainable Development Goals. This includes resilient infrastructure and systems, stimulating innovation, sustainable procurement, consumption, production and industrialisation, especially in marine and coastal areas. This extends to incorporating marine spatial planning and annexing technological maritime innovation such as for the 4th industrial Revolution. It includes reducing adverse externality costs (i.e. noise; light; smell; pollution; litter) and preserving Mediterranean biodiversity and cultural heritage costs as much as possible. It partially includes depolluting the Mediterranean and historic impacts, extending beyond the global definition of blue economy activities striving towards future ecological sustainability. limited sub-regional and municipal data exists, as activities and stakeholders are mostly aggregated at a national and regional level for the blue economy, complicating comparison evaluation efforts between initiatives and strategies. A coordinated policy framework will have to synchronise multiple diverse stakeholder requirements and perspectives.

The Norwegian Arctic approach to a Blue Economy Strategy further correlates national objectives to the Sustainable Development Goals in relation to the biosphere, society, economy and partnership between stakeholders. It specifically focuses on geo-spatial mapping and identification of all local problems, stakeholders, activities and initiatives as a prelude to being able to prioritise developments. The ocean industry sector was selected as contributing at least 20% of employment with significant aquaculture, bioprospecting, oil, gas and cruise tourism potential. In June 2020, Denmark's shipping industry released a decarbonisation and energy efficiency plan through the Climate Partnership Through a Blue Denmark. Denmark is looking at an artificial island with offshore and onshore wind energy capacity to empower up to 3000,000 households near Bornholm in the North Sea with 3 GW but eventually up to 10 GW or 10,000,000 households, with hydrogen as a byproduct for

maritime transport and other options. The Alfa Laval Testing Centre in Aalborg are investigating producing a commercialised and scalable methanol fuel cell to provide reliable shipping power. In Sweden, stakeholders united to form the SARGASSO platform to create a blue economy/maritime industry collaborative partnership. IHamn are creating a parallel network to unite 50 Swedish ports to scale up technology deployment, efficiency and innovation, to increase cost and general competitiveness.

Portugal has developed its own port technology cluster network and Bluetech Accelerator Initiative in response to the blue economy (Santos 2019), to expand beyond the 0.05% existing research contribution to GDP. These serve as innovation and entrepreneur hubs to connect all stakeholders across ports and their commercial value chains. It and the private sector co-finance promising start ups to mature and accelerate. The Mediterranean have invested 999,600 euros (Taylor et. al 2017) in a “Blue Jobs and Responsible Growth in the Mediterranean project” for Algeria, Italy, Malta, Mauritania, Morocco, Libya; Portugal, Spain, France and Tunisia. It aims to generate 120-140 blue economy specialists each year between 2019 and 2023. It created workshops, a master’s programme, online portal and summer school along with Blue Network. Other projects include Earth’s first wave energy park in Sotenas Sweden and first commercial scale tide device in Strangford Lough Northern Island. Spanish marine biotechnology research is investigating anti-cancer drugs. Germany and Denmark are experimenting with hybrid ferries Italy and Slovenia are preserving salt pans as marine protected areas. Taylor et al recognised very few actual start-ups for the blue economy; most being actual existing companies. It mentioned the problem of learning from failures as few wish to publicise them. People often experience reluctance to participate.

In the UK the Admiralty Hydrographic Office hosted a Blue Data Conference in March. Blue Marine Foundation lobbied for 10 national coastal parks to be established around the British coastline. The UK are creating a Maritime Vision 2050 to modernise transport, ports and shipping. It is also heavily committed to funding various ocean/blue economy related proposals via the Commonwealth Secretariat and the separate Foreign and Commonwealth Office based, Commonwealth Marine Economy Programme. As part of the Commonwealth Secretariat it has funded consultancies on fisheries compliance training, online ocean funding databases, ocean progress indicator reports, blue finance, climate finance, blue carbon and other initiatives. For CMEP in April 2021, the British are facilitating support for Antigua and Barbuda to establish a Department of the Blue Economy, a Blue Economy Plan and the proposed establishment of a Centre for Oceanography and the Blue Economy. They are also planning to resume cruises from the 17th May but limited to a 50% maximum capacity or 1000 passengers. Maritime UK announced initiatives to generate 170,000 additional port and maritime industry associated jobs in the next 5-10 years and 8 Free Ports as part of leaving the European Union under Brexit.

The European Commission released its own European Blue Economy Report 2020 in March 2021. France is involved in awarding tenders for offshore wind in Normandy and in January 2021 it affirmed the need to protect 30% of marine protected areas by 2030. In Spain, Andalusia, Asturias, the Canary Islands, Cantabria, Galicia, Navarra and the Basque Country are all committed to developing a European Atlantic partnership devoted to the Atlantic Maritime Strategy, the blue economy and areas such as ports, logistics and marine renewable energy/offshore wind. In March 2021 Spain committed to hosting a session on marine spatial planning and the sustainable blue economy. Spain is also part of the WESTMED Initiative, whereas the region of Catalonia forged its own 2030 Maritime Strategy in 2018. The Atlantic Action Plan 2.0 works on creating a regional blue economy cooperative approach between France, Spain, Portugal and Ireland.

In Italy the Guglielmo Tagliacarne Chamber of Commerce Study Centre published the volume “Economy of the Sea and Green Deal in January 2021. Its blue economy is estimated at worth over 46,700,000,000 euros and 900,000 jobs. In November 2020 and January 2021 IORA Italy hosted 2 webinars on blue economy careers

development and INOGS are scheduled to host their annual Blue Growth Summer School in June, COVID19 dependent. Italy, France, Germany and Portugal are all sending technical blue economy experts to facilitate Kenya's blue economy under the GO Blue Initiative, having received 25,000,000 euros in funding from the EU and UNEP. MV Quantum Group are investigating floating solarvoltaic energy projects in Greece.

The Black Sea are pursuing shared experiences including connectivity, research and innovation, blue skills and careers guidance (Facility for Blue Growth in the Black Sea, 2019). The Black Sea Blue Economy website and platform indicate 3,500,000 euros for a June 2021 project call for Prevention and Preparedness Projects on Civil Protection and Marine Pollution across the Black Sea, Bulgaria, Georgia, Moldova and Romania. 7000,000 is being allocated to multipurpose maritime surveillance and security. Only Romania and Bulgaria gained 200,000 jobs and 2 billion euros to their GDP in directly identifying these particular sectors as blue. It found out how existing business models need to be adapted to follow more sustainable directions for more stable and productive jobs, increasing income and production more responsibly. It mentions the limitations of existing marine data and continuous need to upgrade skills, education and experience. Limited coordination and involvement of most core relevant stakeholders appears to exist. All need to collaborate and professionals encouraged/recruited with improved employment conditions so as to not emigrate or be discouraged from wilful participation towards a blue economy. It also favours advancing technological capacity to maximise potential benefits from new progress. The global blue bio-economy market has been found to offer myriad blue economy opportunities (Lloyd-Evans 2018) and beyond food for marine ecosystem species. This includes partially offsetting at least \$50 billion of estimated fisheries bycatch product waste not consumed and 20% spoiled. Algae biotherapy is another possibility.

3.2: Regional Strategies: Pacific

The South Pacific are targeting the blue economy with its own Blue Economy Conference and Ocean Pathway initiative in 2017 among stakeholders towards attaining UN Sustainable Development Goal 14. Its policies specifically concentrate on ensuring protection of marine and coastal ecosystems (160 voluntary commitments); countering climate change, marine pollution (540 voluntary commitments) and ocean acidification and cultivating fisheries/other blue growth initiatives. It emphasises cultivating research capacity and implementing international maritime law. It also expressed concern that only 5% of ocean territory had been adequately chartered and few existing stakeholders and networks were meaningfully engaged to sufficiently understand the context, risks and potential prospects of a Pacific blue economy. Melanesia alone is estimated as containing over \$5.4 billion of blue economy assets each year. The source defined a sustainable blue economy as one which *"the use of our oceans today enhances rather than undermines natural capital and does not compromise the ability of future generations to generate cultural, social and economic wealth."* It involves decisive actions against any existing or potential threats to this ability. Governments need to mobilise sufficient resources and reform policies with regional and national steering committees to ensure blue economic growth is meaningful and possible including awareness. Pacific Islands Development Forum (2018) proposes private sector engagement including a Pacific Region Ocean Business Leadership coalition, awareness campaigns and stakeholder awareness sessions. It calls for locally devised enterprise development, research, strategies and policies, rather than being externally imposed, recognising existing information limitations. It maintains that trust, transparency, accountability and responsible, responsive leadership are indispensable enablers for blue economy growth.

Fiji, Vanuatu and Tonga are all creating their own National Ocean Policies. From 2015, MACBIO and the Solomon Islands Government inaugurated their Ministerial Ocean Summit. In 2016 they formed an Ocean Technical Working Group to formulate a more integrated coastal/ocean management and marine spatial planning process to align stakeholders. The Solomon Islands has began the transition from the ocean/general economy towards a

green/blue economy with its MACBIO project for marine ecosystem service valuation, with in 2017 approximated the contributions of existing services to be over US \$ 2,500,000,000. A 2017 ocean governance research project for the South Pacific also indicated case study examples of alignment to various stakeholders. It created a National Ocean Policy in 2019, a marine atlas with over 100 datasets of localised marine species and biodiversity information, Arnavon Community Marine Management Area and publicised a MSP brief.

In Australia, the government's task appears to facilitate blue economy growth through innovation, research and entrepreneurship incubation (CSIRO 2017). A specialised blue economy research hub exists at the Universities of Wollongong and Western Australia, whilst the Australian Maritime College/ Institute of Marine and Antarctic Studies (IMAS) in Tasmania, as the only specifically traditional maritime economy sectors, are completely separate from this trend, only emerging in the past 7 years. Australia offers 79 ports, 10% of global sea trade and the third largest global Exclusive Economic Zone, maritime domain of 8.2 million km². From 2012-2025, blue economy activity is projected to accelerate from \$47 to over \$100 billion, excluding \$25 billion of ecosystem services. CSIRO increasingly is prioritising the status of the Indian and Pacific Ocean's health to preserve this. Increased data, information and access to experience via international partnerships with "blue economy champions" is perceived to ensure even more proficient and capable decision making for those establishing blue economy frameworks and approaches. This framework will have to adapt to increased labour mobility and changing technological developments such as improvements in shipping efficiency, largely autonomous without local municipalities and national governments intervening or being involved. In Australia participants were asked to determine effective action tasks based on potential relevance to the target region, its possible impact; time, speed and path to market or success and whether Australia has sufficient existing capacity to make it become a reality. CSIRO has developed coastal management tools; testing mobile solutions to monitor the marine environment, form off-grid cold storage facilities, renewable powered small fishing and recreation vessels, artisanal microfinance and accelerate a bio-prospecting entrepreneurship program. It is investigating a talent scout program to demonstrate best practises and a marine ecosystem restoration crowdfunding platform.

Australia's blue economy approach has prioritised ensuring sufficient institutional capacity and private sector interest or willingness to engage by highlighting oceans as natural capital, livelihoods, good business and drivers of innovation (ANCORS 2016). It recognises how various individuals, organisations and governments perceive oceans/coasts and respond differently. For example, those aiming to preserve natural capital utilise tools such as marine spatial planning and protected areas. Those as livelihoods often favour community consultation and projects to attain their aim. Businesses aim for policies, incentives, deterrents and infrastructure. Those focusing on innovation propose additional research networking, incubation entrepreneur hubs as start-up accelerators and data. Maritime security also remains essential. The source recognised opportunities in ecosystem protection; blue coastal zone management; defence and surveillance; blue industry and energy production including desalination, deep sea mining and offshore renewable energy; along with blue harvesting via fisheries and aquaculture. Others have increased finance, partnerships and institutional capacity (European Investment Bank, 2017) including 12.4 billion euros to maritime transport related projects between 2007-2016, enhancing competitiveness, improved vessel efficiency; climateproofing infrastructure and reducing fossil fuel dependency. It included canal bank and shoreline protection. Funding conditions support cabotage and international marine environmental standards or performance.

The South Pacific through Fiji and the World Wildlife Fund have proposed the Great Sea Reef project aiming to prevent the loss of 90% of its coral species and 44% of reef species by 2050 (Pacific Islands Development Forum 2018). It is prioritising forest and mangrove regeneration, organic agriculture, renewable energy, sustainable fisheries and sea transport. The Office of the Pacific Ocean Commissioner has centralised a source of many related

ocean/blue economy, policy and ecosystem related research including 7 reports related to ocean finance and a Blue Pacific Ocean Report released in February 2021.

3.3: Asia, the Philippines, China, India, Malaysia, Bangladesh and Indonesia

The initial 2016 maritime India Summit attracted over \$13 billion in port and logistics related investments. It directly concentrates on marine fishing (\$5.05 billion in 2016), biotechnology, mining, tourism and leisure, construction, renewable energy, ICT, commerce, education and research, manufacturing, shipping, ports and logistics. It has a direct task Force and stakeholder engagement process to establish a road map, business plan and outcome reports. India's interpretation of the blue economy includes: *"marine-based economic development that leads to improved human well-being and social equity while significantly reducing environmental risks and ecological scarcities."* Yet existing maritime education and training has yet to integrate core blue economy concepts such as sustainable development, ethics and social responsibility. India is currently investigating an Indian Ocean regional approach, rather than developing its framework in isolation, aware of how neighbouring nations and others internationally may affect the extent to which its own strategy will have a successful outcome. In 2014 Bangladesh also sought this via its "Bay of Bengal Partnership for the Blue Economy for nearly 30 million affected value chain participants." China's Five Year National Plan for the Marine Economy includes smart ports, territorial claims and artificial islands, the great Undersea Wall, seabed mining, underwater research stations and residences, submarines, ship repair yards and icebreakers. This aims to extend upon the 35.9 million people directly employed by the blue economy sector, yet has initiated geopolitical tensions around its Exclusive Economic Zone with Japan, the US, Vietnam, Russia, Korea and the Philippines.

Specific Asian blue economy initiatives are summarised in Table 2. Providing awareness of these initiatives presents myriad alternatives, aiming to convince policy makers, businesses and individuals that there are significant benefits, impacts and tradeoffs to pursuing this approach. These activities not only aim to protect ecosystem advantages but simultaneously generate viable livelihoods and facilitate adequate capacity building against climate change, population and ecological pressure growth plus other emerging risks. This requires adjusting existing education and training to empower humans to contribute. International initiatives include re-examining existing transboundary usage of marine areas, promoting greater blue economy awareness and accurate ecosystem/economic valuation of resources. Developing more supportable Western and Central Pacific fisheries includes eco-labelling, tuna supply chain analysis, proactive vessel register and traceability. It includes minimum efficient environmental standards of ships and ports. Maritime supply chains are anticipated to face extended producer responsibility for marine pollution. Domestic policies and laws need to be unified with international counterparts.

Other blue economy approaches recognise existing risks to their maritime domain and sovereignty, integrating it into their strategies, as previously outlined. The region could learn the significance of maritime security governance from Indonesia (Dinarto 2017) by connecting to the SA Navy and others to ensure sufficient protection. Indonesia is also forming regional partnerships, recognising the need to extend awareness of risks and maritime/coastal defences with its neighbours, too jointly pool resources as necessary. Over \$3 billion has been lost each year from poached fisheries. Other threats included 108 piracy attacks in ports alone and 1,300,000 tons of maritime debris. A 2017 National Ocean Policy helped to visualise this coordinated approach and activities conceptually, to facilitate greater cooperation.

Table 2: Asia Blue Economy Initiatives

Cambodia	Sustainable tourism and zoning in Sihanoukville Sustainable port and waste treatment in Sihanoukville
China	Ecological Remediation of Mangroves South China Shandong province artificial reefs, coastal tourism and aquaculture zoning
Indonesia	Mangrove restoration and coral reef rehabilitation, Ecotourism and MPA's; PROPER program compliance of industries to pollution regulations and recognition system. Green ports -PT Teluk Lamong. National Action Plan on Marine Plastic Debris 2017-2025. Fisheries Improvement Project, Pollution reduction.
Korea (Republic of)	Wetland conservation sites, marine protected areas; Fisheries Resources Protection Zone, TAC program, Marine ranching, Comprehensive Plan for Green Busan Port, Coastal Total Pollutant Control System in Masan Bay, Siwha-Incheon, Busan, Ulsan, Gwangyang.
Malaysia	Marine parks and ecotourism with monitoring, Green Ports -shore power/marine sanctuary and ballast water, Sustainable marine aquaculture and fisheries; Alternative livelihood seaweed cultivation and tourism, Climate Change Response: National Coastal Vulnerability Index study; Integrated Shoreline Management Plan implementation, Adaptation Measures
Philippines	Sustainable fisheries -seasonal closure, Amended Fisheries Code, ecosystem-based approach; registration of fisherfolk; conservation of blue crabs and swordfish, ban on sargassum and black corals, Habitat restoration and conservation Be GREEN recruited over 5000 youth, From Hooks to Books produced 33% increase in payments to fishing communities. PHP 35 million was paid to local community as boat rentals. 12 beaches protected 5600 hatchlings. Palawan Materials Recycling Factory averted 80-83% of total waste from the landfill site and oceans.
Thailand	Koh Mak, low carbon tourist destination project, Crab Bank Model in Chumporn and Surat Thani; Seagrass Seeding Bank
Timor Leste	Sustainable fisheries and aquaculture, 8 MPA's, Mangrove rehabilitation, Solid waste management Ecobank and Green Schools
Vietnam	Mangrove restoration in Ca Mau and Tien Giang province, Biodiversity conservation to respond to climate change, Climate smart aquaculture, Green growth for 28 provinces (UNEP)

Source: PEMSEA 2017.

A post-COVID era is bringing unprecedented focus and opportunities across the Asian region including Malaysia and the recent World Bank focus on determining a Blue Economy Landscape for Indonesia. In Indonesia, the blue economy is also starting to gain traction and interest with an EEZ encompassing over 6,400,000 km² of ocean and potential valuation exceeding IDR 3000 trillion. It's potential value and need for sustainability have been the focus of both governments and recent academic articles such as a 2020 one by D Sari and S Muslimah along with the need to emphasise marine spatial planning and integrated fisheries/aquaculture management in policies, initiatives and decision making. In 2019 the National Development Planning Agency Bappenas hosted an event on marine sustainability, the blue economy and SDG's. The government estimated an aim for a projected increase in macroeconomic contribution of the sustainable blue economy from 6.4% of the 2015 GDP of US \$860 billion, doubled to 12% contribution to GDP by 2045. A 2015 PEMSEA presentation valued the ocean economy at \$182.54

billion. The Archipelagic and Island's States Forum and UNDP established a Blue Economy Development Index and Blue Bond Framework. The Indonesian government has also started to consider climate change risks for the future blue economy through initiatives such as the Jakarta Giant Seawall project.

Indonesia's Ministry of Marine and Fisheries emphasise the blue economy in their 2015-2019 Plan. Law No. 32 of 2014 on Marine economy describes the blue economy as follows: "The concept of a blue economy is an approach to improving sustainable marine management as well as marine conservation and coastal resources along with its ecosystem in order to realize economic growth with the following principles:- community involvement;- resource efficiency;- minimize waste; and- multiple value added (multiple revenue)." Any proposal would also need to consider a 2016 article and others relating to the role the ocean/blue economy has contributed to the National Income Accounts. The Agence Francais et Development emphasised the need for blue economy initiatives to value, measure and consider its significant marine ecosystem biodiversity including proximity to an estimated 76% of coral reefs and revitalising the Palu fishing communities/along with others over 17,500 islands, several of which have been affected dramatically by tsunamis and other phenomena. Indonesia has also received attention under the Asian Development Bank Plan for Prosperous Oceans and the World Bank Indonesia Sustainable Oceans Programme. This focuses on supporting sustainable fisheries and livelihoods, building healthy and coastal marine ecosystems and reducing marine pollution. In 2017, the Jakarta Declaration on the Blue Economy focused on Southeast Asia and Indian Ocean Rim ocean economies sectors of various interest. In December 2020, Indonesia's president Joko Widodo inaugurated a \$3 billion Patimban seaport in West Java. He also committed along with 13 other global leaders to publicly protecting more of the oceans and a more sustainable blue/oceans economy under the 30% by 2030 initiative.

A surge increase in sustainable blue economy finance has been introduced in response to the UNEP Sustainable Blue Economy Finance Principles. The Asian Development Bank wishes to commit \$5 billion from 2019-2024 for its Plan for Healthy Oceans and Sustainable Blue Economies with a variety of blended and conventional finance including loans, credit and blue bonds. It indicated existing commitments of \$107,000,000 (54,000,000 from the Bank) for 4 atolls such as a \$13 million commitment to a desalination plant for Kiribati. The Philippines ratified the National Marine Policy in 1994. Since the Changwon Declaration in 2012, the Philippines has joined the rest of Southeast Asia in realigning the ocean sector to become more ecologically, economically and socially sustainable via the blue/oceans economy. Despite over 80% of the Philippines's EEZ being ocean based with a 36,289 kilometre coastline, fisheries and shipping only directly contributed around 1.7% of national GDP in 2009 and 3.7% in 2020. Over 1,900,000 people however are estimated by the government to depend directly on fisheries, aquaculture and interdependent supply chains in the nation. In 2018 a research project estimated that the direct ocean contribution to national GDP and capital accounts was 622,600,000,000 pesos, versus 578,000,000,000 in 2017. A 2018 article estimated 5,400,000 barrels of oil, 55,400,000 trillion cubic feet of natural gas in the West Bank alongside fragile marine ecosystems. The nation is long established for its exporting of seafarers and maritime education/vocational training and recruitment for the cruise industry.

Another 2017 WMU thesis estimated the value of Philippines marine ecosystem services as around US \$966,600,000. A 2019 World Bank report estimated the coast could sustain up to 160 GW of offshore wind marine renewable energy power generated. A 2020 research project for Luzon calculated 111,000 of blue carbon mangroves, 63428 hectares of fisheries, and 132 of the nation's 1800 ports. The Philippines has gradually gained research and policymaker attention in the oceans sector, marine and blue economy related issues. For example, a 2020 World Maritime University thesis analysed barriers to marine scientific research. In January 2021, the Philippines hosted the 5th Kwentong Mandaragat webinar on the blue economy. On 18th April 2021 the Philippines Coastguard seized illegal clam shells worth over US \$25,000,000. In April 2021, Rare advertised the blue economy project consultancy proposal. The Philippines are particularly conscious of ensuring a potent blue economy

framework capable of safeguarding its existing \$966.8 billion contribution to the national economy (Azanza et. al 2017). It possesses over 26,000 kilometres of coral reef with 3,053 fish, 800 seaweed and 500 coral species. It estimated over \$1.5 trillion in ecosystem service based valuation of marine resources capturing total economic, option and non-use values.

In contrast, India favour a more commercially orientated, blue economy vision until 2025 (FICCI 2017). India's equivalent of a Blue Oceans Economic Framework is mentioned as requiring several characteristics to succeed including to *"ensure a just and equitable environment for securing the business opportunities in the Indian Ocean region."* It aspires to *"ensure coordination between mature and emerging sectors. Since mature sectors (e.g. shipping, ports, maritime logistics etc.) have the experience of accounting for security challenges, they could provide valuable lessons to the new emerging sectors (e.g. minerals exploitation and renewable energy) in best accounting for security threats."* It extends to *"including elements of national and human security, marine safety and ecological integrity, both in planning and in operations."* The culmination of this strategy would establish an Atlas of Blue Economy Assets and a Compendium of Best Practises, to share experiences. Thailand hosted a Blue Economy Forum, mirroring Kenya's efforts to emphasis awareness of its intentions and engagement with those most qualified enough to provide inputs. Includes a specific realignment of activities to retain essential ocean health as good business practise. The source contrasted the value of several Asian ocean economies from \$1.97 billion in Timor Leste to \$959.4 billion in China with the poor implementation of coastal planning protection and only 0.5-4.5% as marine protected areas. This necessitated integrated coastal zone management and preservation of sound water quality to levels suitable for aquaculture production and consumption.

Conversely China and the US, as two of the most formidable economic superpowers, with significant navies and maritime domains, have yet to fully conceptualise the transformation of their ocean economies towards a more ecologically and socially conscious model. Considerable marine environment threats jeopardise this but have yet to be sufficiently prioritised along with climate change. Rapid economic growth has been facilitated by fossil fuels but cannot remain indefinitely. China's perspective has been to focus on a coordinated coastal planning and stakeholder response in the 2008 National Industrial Marine Development Plan rather than targeting the environment as with other blue economy strategies globally. Conathan and Moore (2015) recommend the need for a joint ecosystem-based valuation; joint ocean planning, Blue Technology clusters, experiences of best practises and oceanographic data. This approach would be advantageous to pursue to be more internationally credible, reducing reputational, environmental and other risks. China have also pioneered a specific "Blue Economic Zone or free trade area specifically for related activities. This will provide specific incentives and plans, favouring a holistic approach rather than the isolated stakeholder and activity based initiatives of its more free market, international counterparts.

Bangladesh's blue economy is focusing on accurate valuation of ocean ecosystems as natural capital, model policy reform scenarios to set targets and develop public investment strategies along with coordinating the planning process and future directions to consider long term consequences of actions or inactions (World Bank 2018). Accurate valuations are only considered possible once the true status of ecological degradation is accurately and comprehensively captured. It entails identifying all activities and their geographic value chains, separating the blue economy sector from measuring its economic hinterland where possible. Scenario mapping is advised to consider both a "brown economy business as usual scenario" and a blue economy, whilst considering changing risks, trends and opportunities. It includes specific penalties and incentives to convert ocean sector participants to more sustainable alternatives. Encouraging stakeholders to relinquish information, to avoid prevarication and prepare is also seen as essential to ensure mutually advantageous, blue economy future outcomes are achieved and remain. Core elements were summarised in its policy framework: D.I.R.E.C.T. + MAX. This translates to **D**evelop and strengthen national policies to better integrate blue economy factors; **I**mplement policies for a healthy, resilient and

productive ocean space. It adds: “**R**aise Awareness with measures such as a virtual common education platform,” “**E**nsure ocean wealth is kept national and local, “**C**onstruct infrastructure (soft/hard/blue/green); and “**T**ransform research and development and national knowledge centres via national links. A public-private sector partnership is proposed under **MAX**imize to ensure sufficient finance as available, leveraged and allocated.

In Malaysia the blue economy has received increasing attention from policymakers and certain stakeholders since 2017 as a new avenue catalyst for growth with an EEZ of 453,186 km². In 2017 the Maritime Institute of Malaysia, PEMSEA and GEF hosted a series of workshops to engage the community and other stakeholders on implications and potential prospects of the blue economy in Malaysia. The Maritime Institute of Malaysia Centre for Coastal and Marine Research estimated marine protected area ecosystem values to be between RM 39,600,000 and RM 3,600,00,000. Malaysia has 612 coral and 1619 fish species and other biodiversity benefits including blue carbon potential. Total marine ecosystem values were estimated at US \$17.7 billion in 2019, with a 23% of GDP forecast for the ocean economy as its contribution. It occupies at least 4% of total Malaysian employment. The Penang Institute is also focusing on the blue economy. Fish contributes around 44% of the total animal-sourced protein intake Malaysians are among the ocean’s biggest consumers of fish (56.9 kg/capita/year) – far above the global average of 20.3kg per capita. In 2018 it imported 224,578 tonnes of fish valued at RM 1.7 billion. In 2017 Penang’s food fish sector produced 96,970.4 metric tonnes, valued at RM 1.4 billion. In 2019 the Ministry of Economic Affairs promised a detailed series of research projects specifically investigating how to benefit and implement a more effective blue economy in Malaysia. This was reinforced by a National Maritime Conference. This consultancy approach therefore seeks the following objectives designed to expeditiously determine an implementation pathway forward.

3.4: Regional Strategies: Caribbean

The Caribbean’s blue economy strategy approach has been to focus on ensuring the maritime sector can provide the similar job substitution from the coal-based brown economy, quality of life and social development benefits such as poverty eradication as the green economy. Higher GDP growth is specifically targeted by the Commonwealth from increased food security from renewable fisheries and a higher proportion of GDP with employment from ocean related sources. The Caribbean hosts over 25,000 registered trawlers with over \$700 million in economic contribution. Yet 35% of stocks are overexploited and need preservation for the future. Limited aquaculture exists as a substitute. Marine Tourism contributes over 75% of regional GDP. The Panama Canal represents a major transshipment hub. The strategy specifically emphasises the benefits of import substitution, energy security, balanced economic growth, disaster risk and climate change mitigation. The 2013 Caribbean Climate Initiative formally recognised this need to accelerate marine environment conservation as 20% by 2020 and was immediately ratified by 9 nations. Significant biodiversity exists from over 12,000 fish and 13,000 unique plant species. The Eastern Caribbean Regional Oceans Policy and Action Plan presents a coordinated response to marine spatial planning and use. Sustainable finance and blue economy entrepreneur incubation hubs are pursued by the UNDP Accelerator Lab/Ministry of Blue Economy in Barbados and the Branson Centre of Entrepreneurship in Jamaica. Richard Branson has also favoured a Carbon War Room to convert Caribbean economies away from fossil fuels. Grenada is forming a Blue Growth Masterplan preserving 25% of its marine environment areas by 2020 plus a Blue Growth and Oceans Governance Institute. A Blue Network to capitalise on innovation and networking collaboration is being formed. Barbuda are forming a community blue economy and integrated coastal zone management strategy via the Blue Halo Initiative.

The Caribbean, however has experienced significant barriers to creating these blue oceans economic frameworks including limited experienced and trained professionals; access to finance; insufficient planning and policies,

access to technology, markets, infrastructure, lack of global bargaining power and sovereignty. Limited research capacity exists. Planning for future risks and challenges is not apparent in existing policies, often being reactive rather than proactively anticipating risk events. In 2017 Hurricanes Irma and Mike caused losses of 350% of the British Virgin Islands, 224% of Dominica's and 51% of the Turk and Caicos Islands' GDP. Existing approaches lack connections, coordinating each other, as in the South Pacific. Challenges exist as to how sustainable certain activities such as cruise tourism, already operating at high volumes, can be for certain small ports and island communities, if not responsibly managed. From 2007-2017, cruise tourism stakeholders increased by 75% to 29.3 million passengers. Yachting provides up to 53% of British Virgin Island visitor revenue. In response, the Commonwealth recognised seven enablers of Blue Growth that its strategies and methods would need to ensure. These include a healthy, resilient and productive marine environment; infrastructure; technology, research and development; business development, investment and finance; maritime surveillance and enforcement; education and capacity building and ocean governance. It entails decisive leadership; economic diversification, integrated cross-sectional marine spatial and environmental planning, security and engagement in activities. The greater the awareness, will and capacity, the more inclined blue economy stakeholders are to cooperate and participate, the more efficacious, any blue economy framework is proven to be.

Figure 1: The Caribbean



Source: Mapoftheworld.com, April 2021.

Blue Economy access to finance has been established as one of the most significant challenges that any Blue Oceans Economic Framework needs to secure. This is recognised in the Caribbean aiming to promote investment market friendly and entrepreneurial initiatives, given governments alone cannot sufficiently secure this future without private sector willingness to become involved and commit (Caribbean Development Bank 2018). Existing coral reefs decreased over 30% and 70% of beaches are experiencing significant erosion. Renewable energy only comprises 20% of the average total Caribbean power sources. High opportunity and inaction costs exist in favouring a “business as usual” approach. Therefore, states are seeing to reduce moral hazard and asymmetrical information constraints for businesses and individuals. Initiatives such as the 2009 Caribbean Large Marine Ecosystem Project and the Caribbean Regional Oceanscape Project further strive to accomplish this through a formal knowledge hub and evaluation of policies to coordinate effective blue economy growth. A Caribbean Catastrophe Risk Insurance Facility and Oceans and Aquaculture Sustainability Facility have also been prepared. Finance options include climate funds, impact and blue bonds, debt swaps, aid, crowdsourcing, diaspora funding and remittances; insurance, blended financing, taxes and tourism/conservation levies and sovereign wealth funds.

These need to be accompanied by ring-fenced safeguarding measures to ensure transparency and accountability so funds are channelled off directly into blue economy related policies.

The Caribbean has undertaken various initiatives to establish ocean governance and the blue economy. These are becoming more integrated into existing instruments such as the Caribbean Regional Fisheries Mechanism, a Regional Food and Nutrition Strategy and Community Climate Change Centre. 35.5% of global cruise tourism occurs in the region contributing over \$30 billion to economies. Each cruise ship passenger contributed on average \$222-300 per visit, a total of \$2.4 billion, but very rarely came back as a stayover visitor (ACS Directorate of Sustainable Tourism 2016). Existing efforts are directed towards scaling up individual ecosystem, marine protected areas, tourism and other projects to be more effective nationally and regionally. These aim to reduce vulnerability and enhance resilience of coastal communities. Barbados's ocean economy strategy echoes those of Antigua and Barbuda, the Bahamas, St Kitts and Nevis, St Lucia plus St Vincent and the Grenadines, in enforcing governance over their existing and extended Exclusive Economic Zones (Davies 2018). It focuses on valuation and chartering; then determining action plans the prioritisation of core resources and targets. They have pledged common enforcement, monitoring, awareness and assistance via a Commonwealth Blue Charter. The World Bank echoes the need to target threats first, interested in the macroeconomic potential of what it terms "natural capital," supporting business supply chain resources and livelihoods simultaneously, ultimately conserving it so it can be expanded for further future production and consumption (World Bank 2017). It argues the economic benefit of ecosystem restoration and promoting responsibility for the consequences of our decisions and actions. Core investment principles it targets in its blue economy approach include: Sustainable Development, Sustainable Livelihoods; ensuring marine ecosystem health; Integrated Ocean Governance; Science based precautionary and effective adaptive decision making. It extends to duty of care and accountability; ecosystem-based management approach along with ocean solutions that will reduce climate change risks and allow the development of climate change related opportunities.

In 16 December 2019, the World Bank approved a US\$20 million Credit for Grenada's Transition to a Resilient Blue Economy. Dominica received a 2017 blue economy scoping study under the UNDP for the Caribbean Large Marine Ecosystem Project and attention under the Caribbean Large Marine Economies programme. St Lucia has undertaken a National Ocean Policy and is preparing Marine Spatial and Blue Economy Plans. St Vincent and the Grenadines held a National Blue Economy Seminar in 2018. Antigua and Barbuda received UK government support to host a Blue Economy Roundtable event for the Eastern Caribbean in 2019. In November 2020, Montserrat activist Veta Wade hosted the inaugural Caribbean Blue Economy Conference. In April 2021 the Commonwealth Secretariat and University of the West Indies announced a consultancy call to investigate the feasibility of establishing a Centre of Oceanography and the Blue Economy in Antigua and Barbuda.

Caribbean marine fisheries related policies that need to be considered include the Caribbean Community Common Fisheries Policy and Regional Mechanism and the NOAA Caribbean Reef Fish Fishery Management Plan. The Caribbean Fishery Management Council has plans for Coral, highly migratory species, queen conch, reef fish, and spiny lobster species. A Legal review of blue economy policies for Caribbean Marine pollution needs to consider the Caribbean Regional Management Plan for Marine Litter. This is aside from any global and local maritime law, IMO conventions on ballast water, global biofouling, MARPOL and other related initiatives/policies. Other specific aquaculture, marine conservation and protected area or blue economy policies and legislation could also be critically reviewed and engaged with. Examples include the British Virgin Islands, Fisheries Order, Jamaica Fishing Industry Regulations and Grenada Fishery Regulations.

In the Caribbean, Barbados includes the specific example of aquaculture (Simpson 2019), increasing production by 29% on average per year from 2006-2018 from 2 tons to over 26 tons. It generated \$256,000 in revenue in 2016, 96% dominated by red tilapia followed by red claw crayfish for local markets. This prioritised import substitution. Yet it only supports 15 minor aquaponics producers and 1 commercial farm. Simpson cites the absence of aquaculture support and recreation; existing land and marine environment shortages, information limits and allocation of resources towards tourism dominates. It has introduced aquaculture as school feeding schemes and proposed future projects are powered by renewable energy. Jamaica also recognises prospects for the blue economy for blue carbon sequestration, coastline protection, bio-filtration, fishing, tourism and shipping once a database of resources is initiated (Green 2017). It specifically tried to profit from dive tourism, recognising its over \$11 billion contribution towards the US economy, with 4.56 million visitor days per year and supporting 26,000 jobs in dive trainers/leaders; boat captains and crew plus service technicians. It estimated one dive shop can generate \$4,500 per dive site per day. It recognises ecological and physical carrying capacity need to be considered, with eco-literate and professionally trained instructors. Aquaculture is not fully commercially developed but Jamaica has a prototype oyster and Irish moss facility in Bowden Bay. It is starting to investigate species such as mangrove turnicutes and black sea rods for biotechnology prospects. Yet existing ecosystems have experienced so much significant loss, it is considering a 100 metre buffer coastal zone protected against encroaching development. It also aims for indicators to track and monitor how various activities are progressing,

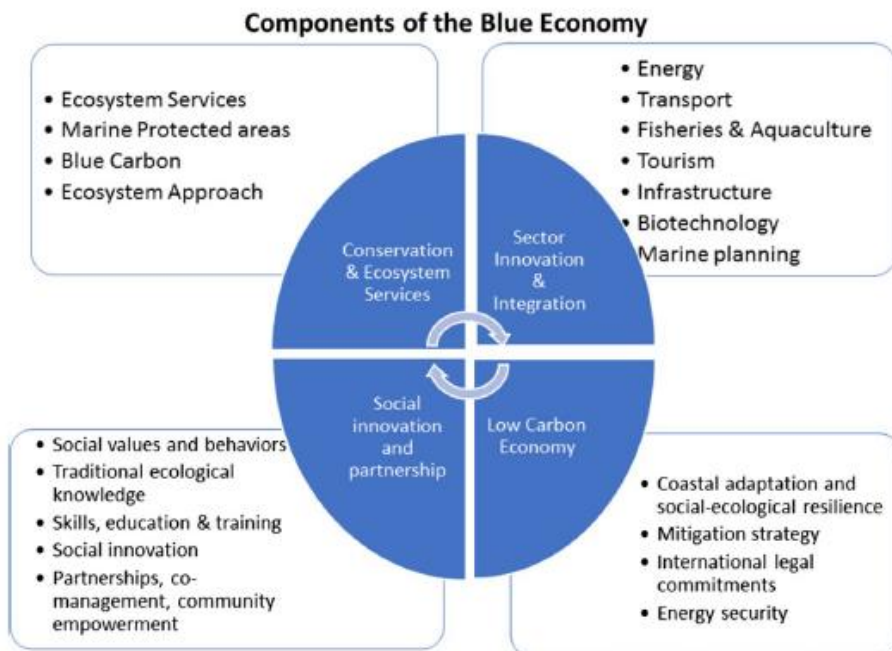
Recent blue economy tourism initiatives include. On June 2020 the World Bank and OECS published a tender on blue economy tourism diagnostics after it was identified as a possible area for growth in a series of OECS webinars by Professor Dickon Howell. It was also recognised as a focus by the G20 Development Working Group as a means of mobilising communities to address threats such as coastal erosion, pollution, overfishing, and climate change, whilst supporting SDG', local development plans, preserve income generation and ecosystem services/natural capital. It is also recognised as crucial to invest and pursue solutions for blue economy tourism given existing economies' structural dependencies as by the Institute for Sustainable Development and International Relations IIDRI. The Caribbean Sustainable Tourism Framework, Eastern Caribbean Regional Ocean Policy and Action Plan, the Caribbean Development Bank and World Bank are all investigating more sustainable mechanisms of ecotourism and diversification from traditional fisheries and related ocean activities. More recently COVID19 has unprecedented implications as pandemics for the global future of tourism; away from traditional dependency upon mega cruise ships and more towards yachting, recreational and eco or experience based tourism. Virtual tourism experiences have also proven popular during the pandemic; whilst projections from business/event and hospitality tourism will decline based on increasing use of technology and digitisation of the future of work; reducing travel requirements from Skype, Zoom, WhatsApp etc.

Specific Caribbean blue economy and tourism developments include the growth of marine protected areas, the Grenada Underwater Sculpture Park, various submersible based and dive tourism; blue carbon and volunteering experiences. Others may include mixed residential waterfront, students academic and retirement community/health tourism and inter island ferry services. Marine renewable energy offers chances to empower small communities whilst offsetting climate related emissions. The Caribbean Development Bank estimated significant potential given over 22,700,000 visitors to the region in 2018, 2% of the global total, dominated by cruising. Higher value may arise in the post COVID era in converting these to long stay numbers, with greater projected expenditure. A significant global surge in investors seeking sustainable impact and blue economy finance investments; provides unprecedented options to mobilise resources long term, whilst restoring the marine ecosystems and biodiversity in the Caribbean that attracts so many visitors. Therefore, any subsequent development of blue economy policies and legislation will need to adapt to these trends, along with the 4th IR, COVID fiscal and other constraints, news, developments and funder initiatives.

3.5: Regional Strategies: South America

In contrast to other Regions, South America remains one of the increasingly few along with Russia and the Middle East that expresses minimal interest or active involvement in formulating an approach to the blue economy. This absence was identified for Peru, who continues to favour a more extractive approach to fishery exports, helping to undermine global progress (McKinley et al. 2018). 86% of fisheries are industrial and Peru is ranked among the top global exporters of wild fishmeal and fisheries products. A workshop of only 44 stakeholders particularly focused on the blue economy, tourism and transport as one of the few sources to refer to forging a blue oceans economic framework or method approach. It seeks greater awareness and active involvement with global concerns; given increased reputational and other risks in not favouring the same direction as many other global nations. It recommends forming a greater marine protected area network and ecosystem impact assessment of current sectors as an initial step forward. Increasingly it utilises the concept of the more familiar green and low carbon economies, to adapt towards the Peruvian blue economy, but with a similarly defined scope as the global blue economy as illustrated in Figure 2. Peru's existing 1992 Fisheries Laws and other institutional frameworks are perceived as increasingly ineffective to secure these components, preserve biodiversity and natural resources for forthcoming generations. Tourism and the guano industry have also lacked equivalent attempts to connect directly to a more sustainable, long term planning approach. It further aims to investigate more individual blue economy value chain sectors along with people's awareness and psychological perspectives; in order to consciously influence enduring behavioural changes. In March 2021 the World Bank announced a proposal for consultants to investigate Peru's blue economy and finance related institutions.

Figure 2: A Peruvian Blue Economy Method Approach



Source: McKinley et. al 2018.

3.6: Regional and Local Strategies: Indian Ocean and East Africa including Kenya, Seychelles, Mauritius, Djibouti

Globally and across many nations, organisations and investors; the blue economy is receiving increasing attention in policy frameworks, as people strive to radically transform the oceans. Most recently the World Bank and African Development Bank have partnered with other stakeholders to consider an African Package for Climate Resilient Ocean Economies up to \$3.5 billion. Mobilised resources include \$220-\$280 million by 2024 and an additional \$450-\$550 million for Strengthening Coastal Resilience in West Africa. It also forms part of the World Bank Africa Climate Business Plan to establish an African Climate Resilient Investment Facility. It is proposing up to 8 African blue economy and 10 alternative coastal fisheries and livelihood plans and assistance in implementation

Although not formally aligned to national, regional or local blue economy initiatives, Africa stakeholders are pursuing various related projects such as a New Suez Canal and ports in Lamu, Bagamoyo, Badagry, Boegoebaai, Lekki and Kribi with value chains and multiplier benefits towards employment, development and related developments. E-commerce (growing from \$8 billion in 2013 to 18 billion in 2018) and the 4th Industrial Revolution also need to be core parts of any framework or policy initiative concerning the maritime sector.. Logistics costs, poor maritime connectivity and maintained infrastructure, high logistics costs and cargo dwell time hinder development of seaborne and lake trade. Few fleets exist for effective cabotage and ship repair facilities are present. Whilst no African nation is ranked in the top 35 shipowner countries, more are favouring local and pan-African fleets. Tourism supports over 22,000,000 jobs and 8.5% of continent GDP, 95% situated in coastal nations with blue economy potential. Fisheries contributed over \$6.5 billion to exports but lost another \$1.5-\$2 billion in poaching. Ghana has enacted the first prototype wave generating energy source in Africa, producing 100 megawatts. Yet most of Africa lacks the technological, skills and financial capacity to engage with marine renewable energy and other emergent areas. A Mauritius Ocean Economy Strategy devised seven principles of Economic Efficiency; greater Equity and Social Justice; Ensure Ecological Sustainability; Social Partnership; Safety and Security of People by the Sea; Compliance with International Instruments along with Facilitate Ocean Knowledge and Understanding. It created seven clusters and an Ocean Economy Ministry.

A West Indian Ocean Strategy for the blue economy including African nations (Kelleher 2015) is defined as “*marine-based, environmentally sustainable economic growth and social wellbeing.*” Its prime objectives emphasise the need to measure the blue economy prior to identifying more efficient and viable principles capable of accelerating their contribution to various ecological, political, social and economic targets of stakeholders. A greater regional knowledge network and connectivity are viewed as necessary. The challenge exists in creating a regional framework to encapsulate cross-national areas, beyond individual territorial jurisdiction on the high seas, averting the “tragedy of the commons” or “moral hazard” concern over collective access to resources. It proposes GDP as a measure needs to consider one metric monitoring the state of natural blue or ocean capital and another measuring socio-economic distribution effects of blue economy benefits. A framework needs too entail these benefits remain protected; costs are minimised as much as possible and equitably distributed. Access to funding is necessary. Actions need to reconcile multiple participant’s agendas with blue economy priorities for conflict resolution. It further anticipates forming a response to the reactions of existing extractive industries which may refuse to adapt, resisting change. These may undermine efforts to enhance sustainability and the circular economy.

For example, the Seychelles is among the global pioneers in blue economy strategies with its own Blue Economy Ministry, Road Map and University Research Institute. It targeted blue carbon bonds, \$21,000,000 debt-for-nature swap and 30% of marine areas to be protected. The Seychelles Blue Economy Strategic Policy Framework and Roadmap (Commonwealth Secretariat, 2018), aim to implement a blue economy vision by 2030 linked to the Paris

Agreement on Climate Change and 2030 Sustainable Development Agenda. *“The Blue Economy vision is to develop a blue economy as a means of realising the nation’s development potential through innovation, knowledge led approach, being mindful of the need to conserve the integrity of the Seychelles marine environment and heritage for present and future generations.”* Its 4 central goals include economic diversification and resilience; shared prosperity through high value jobs and local investment opportunities; food security and wellbeing; integrity of habitats and ecosystem services through sustainable use. As part of this framework, its methods specifically aspire towards economic efficiency, sustainability, social equity, good governance, resilience, research and innovation combined with partnerships across all stakeholders. It requires proactive risk management, investigating and exploring new opportunities. Ecosystem based accounting is considered a capable tool of attaining its optimal marine spatial planning approach by 2020. Its decision to incorporate a monitoring review mechanism will enable it to continuously modify its blue economy framework to ensure it attains the above goals and Sustainable Development Goals continuously; which many other international strategy methods lack.

including the Blue Economy Roadmap, Seychelles’ National Climate Change Policy: “Making Seychelles climate resilient,” Seychelles Marine Spatial Planning (MSP) and Seychelles Coastal Management Plan (CMP). Other projects of relevance include the World Bank assessment of government’s institutional and technical capacity for implementation of Seychelles coastal management plan 2019-2024 The Seychelles Conservation and Climate Adaptation Trust (SeyCCAT) and the SWIOFish3 (World Bank) project Blue Carbon assessment in Seychelles, the UNDP Ridge-to-Reef project and The Global Climate Change Alliance Plus Initiative (GCCA+) (EU). The Seychelles Blue Economy Strategic Policy Framework and Roadmap (Commonwealth Secretariat, 2018), aim to implement a blue economy vision by 2030 linked to the Paris Agreement on Climate Change and 2030 Sustainable Development Agenda. *“The Blue Economy vision is to develop a blue economy as a means of realising the nation’s development potential through innovation, knowledge led approach, being mindful of the need to conserve the integrity of the Seychelles marine environment and heritage for present and future generations.”* Its 4 central goals include economic diversification and resilience; shared prosperity through high value jobs and local investment opportunities; food security and wellbeing; integrity of habitats and ecosystem services through sustainable use. As part of this framework, its methods specifically aspire towards economic efficiency, sustainability, social equity, good governance, resilience, research and innovation combined with partnerships across all stakeholders. It requires proactive risk management, investigating and exploring new opportunities. Ecosystem based accounting is considered a capable tool of attaining its optimal marine spatial planning approach by 2020. Its decision to incorporate a monitoring review mechanism will enable it to continuously modify its blue economy framework to ensure it attains the above goals and Sustainable Development Goals continuously; which many other international strategy methods lack.

Seychelles recent Blue Economy developments to integrate and consider include an August 2020 Fisheries Travel Guide as part of the Fisheries Transparency Initiative and recently increasing marine protected areas as part of a \$22,000,000 EU debt for nature swap to 30% of territorial waters. The Seychelles Climate and Conservation Trust has already committed to dispensing over \$1,500,000 to aid economic empowerment of coastal communities. The Seychelles provided the pioneering global blue carbon bond, supported by the World Bank for \$15,00,0000. Further tourism opportunities may occur from the July Mauritius oil spill disaster tragedy, directly threatening the Blue Bay Marine Park and tourism. It is also essential to consider various Seychelles climate change aspects, projects and initiatives. The Commonwealth Secretariat also aided the Seychelles to develop the Blue Economy Roadmap. The Seychelles also hosted a 2014 National Blue Economy Stakeholder Forum and a second one in 2015. In 2015 it identified various specific blue economy projects at a 2015 Commonwealth meeting in London for ports, shipping, tourism and leisure, food security and health; monitoring and surveillance; ecosystem and habitat services; energy and raw materials.

On 31 August 2020 the Seychelles committed even more visible to renewable energy with the first floating solarvoltaic farm project, offering blue renewable energy opportunities. The May 2020 Seychelles National Climate Change Policy calls for a rights based approach to climate change, including justice, the Precautionary Principle, sustainable development, Integration, Partnership and education. This follows on from the 2017 IMF Seychelles Climate Change Policy Assessment and the 2014 SARUA Seychelles Climate Change Report. The IMF Assessment emphasised the need to consider clean renewable energy, carbon markets, taxes and other instruments. SARUA focused more on the need to integrate climate change projections and scientific evidence/capacity building, when considering further socioeconomic and ecological development, the need to consider policy review and community outreach. A 2017 USAID project focused on restoring coral reefs and marine conservation activities as have similar efforts by Nature Seychelles, SEYCCAT and other NGO stakeholders following an ecosystem based and blue carbon market pricing approach. The need to integrate climate change into the blue economy has been emphasised not only in the National Roadmap but the University of Seychelles Blue Economy Research Institute, WIOMSA, the Seychelles Government, World Bank, external donors and others including a 2016 Indian Ocean Commission presentation.

In contrast for Kenya a fully Blue Economy process marks a comparatively recent phenomenon for a nation whose maritime interests were more traditionally orientated towards fisheries, ports, coastal, cruise and marine tourism only contributing 2.5% to its GDP. Kenya is determined to prioritise economic growth, without specific reference to how its marine environment will be protected. It specifically targets fisheries and aquaculture; maritime transport, ports and logistics services; extractive industries and culture, tourism, leisure and lifestyle (Omingo 2017). Its prime instrument emphasises the need for maritime safety and security to preserve territorial and resource integrity. It emphasises linkages towards the African Maritime Development Agenda investing in maritime infrastructure and industry. Government cargo is worth \$0.14 billion, providing options of 54,570 containers to support a domestic shipping company. In 2015 marine tourism contributed \$0.6 billion to the Kenyan economy; fisheries \$0.5 billion and maritime transport/ports \$0.73 billion.

Specific projects include Mombasa and Lamu's port expansions, a national shipping line and aquaculture. Aquaculture only contributes less than 1% to GDP but expanded from 4,452 tons in 2008 to 18,700 in 2015. Inland aquaculture established 48,000 ponds, 3,000 Lake Victoria cages supporting 2,000 jobs, 4 mini processing facilities and 5 billion Kenyan shillings. It dreams of African fish consumption averages increasing from 4.6 kg to 10 kg per year. Is also focusing on reducing the cost of seed, seaweed, cosmetics, feeds and other inputs. The Blue Economy Presidential Task Force established in 2017 targeted Kilifi, Shimoni and Lamu fishing ports plus enabling human resources aiming for 10,000 seafarers. Kenya also has a Ministry of Fisheries and the Blue Economy specifically dedicated to coordinate this sector politically and via policies. Mombasa and Lamu ports received expansion finance from 2015-2019. Three billion Kenyan shillings has been invested in Kisumu port, projected to produce over 10,000 jobs, with additional money towards a railway extension and industrial park scheduled. Canada are expressing interest in training local youth in the blue economy. In 2019, Kenya opened the Bandari Academy to emphasise the need for additional investment in human capital via education and skills development training. Kenya also received 10 billion shillings from the World Bank towards 5 coastal projects specifically devoted towards financing the blue economy including Shimoni fishing port.

Duke University's Middlebury Centre has also conducted a 2018 blue economy baseline strategy for Kenya and Tanzania. In June 2018 the Japanese development agency JICA completed a data collection survey for Kenya's blue economy in Nairobi, Mombasa and Kisumu to assist the implementation of the Kenya Vision 2030 and 2018-2022 Third Medium Term Plan to focus on the blue economy. It targeted aquaculture and fisheries, ports, shipping, tourism and the environment. The Kenya Maritime Authority also incorporates the blue economy in its strategic plan. In November 2018 Kenya's Youth Congress held a fact-finding mission to investigate integrating youth into

the blue economy and the extent to which they had potentially benefitted, focusing on low ownership of fisheries and tourism and the need for land and other support including around Kisumu and Lake Victoria. One research on leveraging the blue economy in Western Kenya (Gilani 2018) emphasizes the need for viable alternatives given the historic decline in conventional Lake Victoria and ocean traditional fisheries. Local governments including Kisumu County in its 2018-2022 Integrated Development Plan are embracing blue economy prospects as seen through its 2019/2020 request for consultancy services to develop the strategy for harnessing the blue economy, mirroring Durban's approach to develop a Blue Ocean's Economic Framework Strategy as the first African city.

Kenya hosted a popular Blue Economy Conference in November 2018 with over 18,000 participants. It revised its Fisheries Ministry to incorporate the blue economy and form a Blue Economy Implementation Committee. The conference issued the Nairobi Statement of Intention in which many stakeholders pledged to advance the interests of the Kenyan and global blue economy via targeted political, financial, awareness, training and enterprise support. Kenya also hosted Africa's first Blue Economy and International Association of Maritime Economists Conferences. It is aiming for a new repair industry, marine cargo insurance and Maritime Cluster Development Funds to create an extra \$4.3 billion to Kenya's GDP by 2019. However, certain concerns have been highlighted (Benkstein 2018) about how nations such as Kenya can afford to ensure capable governance and sovereignty; social cooperation; economic inclusion and ecological protection). For example, piracy cost Kenya \$300-400 million from 2008-2012, while illegal fisheries poaching cost over \$100 million per year. 4,600 local fishermen were paid \$17,500,000 and promised LAPSET training, in response to a court judgement over rapidly expanding Lamu Port.

Therefore, Kenya's blue economy offers potential via recovery and myriad emerging blue economy opportunities, further motivating the need to create a blue economy strategy, roadmap, Action Plan and other practical outcomes, as envisioned by the Terms of Reference in this proposal. This aims ultimately to fundamentally assist core stakeholders to attain a sustainable blue economy future, climate proofing as much as practically possible, against projected climate change and other emergent risks. This research will aim to assist to implement its core pillars of a localised Mombasa Blue Economy Strategy/Plan as a catalyst towards Kenya Vision 2030 and the 2018-2022 Third Medium Term Plan nationally. It aims to ensure a more inclusive social stakeholder engagement process towards the Strategy and implementation of UN Sustainable Development Goals, especially 13 and 14. As declared by the President, this strategy also aims to support a strengthening of the state's capacity in maritime governance, including the defence of the environment, the preservation of territorial integrity and the defence of national sovereignty against threats such as climate change, piracy and poaching/illegal and unregulated fishing. The development and initiating economic activities in the ocean space is part of boosting economic activities for developing countries. As a developing country, Kenya, the World Bank and Mombasa County have identified and prioritised blue ocean economy as a strategic economic sector in the country. As a result of opportunities presented by the blue oceans economy. They have adopted this as one of the strategic mechanisms to fast track implementing the Blue Oceans Economy in the country. For Mombasa Kenya via the roadmap and proposed strategy to achieve sustainable blue oceans economy, it requires to take stock of its current blue ocean's economy activities in and along its shores, then map out the value chain of the existing activities, then identify the gaps and the opportunities that need retention, preservation support and development.

Kenya hosted a popular Blue Economy Conference in November 2018, revised its Fisheries Ministry to incorporate the blue economy and form a Blue Economy Implementation Committee. Certain stakeholders appear determined to prioritise economic growth, without specific reference to how its marine environment will be protected. It specifically targets fisheries and aquaculture; maritime transport, ports and logistics services; extractive industries and culture, tourism, leisure and lifestyle (Omingo 2017). Its prime instrument emphasises the need for maritime safety and security to preserve territorial and resource integrity. It emphasises linkages towards the African Maritime Development Agenda investing in maritime infrastructure and industry. Government cargo is worth \$0.14 billion, providing options of 54,570 containers to support a domestic shipping company. In 2015, marine tourism contributed \$0.6 billion to the Kenyan economy; fisheries \$0.5 billion and maritime transport/ports \$0.73 billion.

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Table 3: African Individual Blue Economy Initiatives

Project Name	Countries Involved	Aim
Blue Ventures	Madagascar	Blue carbon and marine conservation
Mikoko Pamoja Mangrove Carbon Conservation Project	Kenya	Carbon and marine conservation provide >\$12,000 revenue
ASCLME (Agulhas and Somali Large Marine Ecosystem)	Comoros, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, Tanzania	Marine Ecosystem Protection
Nairobi Convention Clearing House Mechanism	Comoros, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, Reunion, Tanzania	Marine Knowledge and Research
ODINAFRICA (Ocean Data and Information Network for Africa).	Comoros, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, Reunion, Tanzania	Marine Knowledge and Research
COAST-MAP-IO	Comoros, Kenya, Madagascar, Mauritius, Mozambique, Reunion, Tanzania	Data collection and marine surveillance/exploration
TRANSMAP (Transboundary Network for Sustainable Marine Protected Areas)	Mozambique, South Africa, Tanzania,	Marine Protected Areas
WIOFISH Database	Kenya, Mozambique, Seychelles, Tanzania, South Africa	Fisheries
WWF Coastal East Africa Initiative	Kenya, Tanzania, Mozambique	Community based natural resource management

Source: Author Derived from UNECA, 2017,

Since before 2001, Djibouti has had a series of Fisheries Development projects. Recently in Djibouti the Centre for Leadership and Entrepreneurship established a call for proposal submissions to develop related fishery sector Action Plans for the blue economy and subsequent related entrepreneurial training, receiving World Bank funding support. Other area related initiatives include the 2017 recommendation of the European Commission to develop

a SME incubator within Djibouti to support the Chamber of Commerce, Young Entrepreneur Club and other stakeholders. In 2019 the World Bank identified many opportunities for fisheries development, integrated coastal zone management and the blue economy across the Middle East and North Africa. This included Djibouti with only around 1,800 fisheries tons exploited, despite estimated sustainable fisheries potential up to 30,000 tons. It identified the need for supply chain development, market and marine conservation awareness and product demand/supply. In July 2019 IGAD held a 3 day conference and workshop on developing the Djibouti blue economy with a Strategic Manual for the Valuation of the Blue Economy. In January 2020 the Chinese political leadership met with Djibouti President Ismail Omar Guelleh to link the blue economy as part of the Djibouti Vision 2036 and China's One Belt Maritime Silk Road initiative. Norway have also expressed interest in related fisheries and oil partnerships. Djibouti also has a new Code of Conduct devoted to helping improve regional maritime safety and security given Somalia linked piracy threats to vessels.

3.7: Southern Africa (Angola, Namibia, South Africa, Mozambique)

The SADC Blue Economy Concept Paper was an exploratory research proposal to develop a subsequent related Secretariat call for tender to develop a SADC Blue Economy Strategy that has yet to finalised. Subsequent ocean industry/blue economy related industry development are therefore advised to ensure that decisions are determined based on ecological surveys and empirical, scientific evidence prioritising marine conservation through systems measuring changing environmental, climate, ocean, species and risks over time. It also advises encapsulating marine spatial planning to investigate and factor in existing and proposed land, coastal and marine activity uses, purposes and stakeholder requirements; whilst consulting as many users as practical. It also highlights the need to ensure communities receive equitable access to resources, sharing in benefits, as a core distinction between the "blue economy" and its predecessor "ocean industry economy", for more sustainable livelihoods. The SADC paper also counsels the need to factor an ecosystem based approach that not only preserves as much biodiversity as possible but also extends it; considers linking sustainable fisheries management, blue carbon opportunities as buffers against climate change and proactively responding to anticipated risks such as ocean acidification or coral reef bleaching. It also emphasises the need for sound mutual cooperation over issues of ocean governance with "common yet differentiated responsibilities." This possibly could extend the role of the BCC to consider more directly facilitating improving training, research, funding, information sharing and institutional capacity sharing such as technical staff, technology and resources transfer pooling. It also extends to possibilities of mutual law enforcement agreements.

The Angolan National Development Plan indirectly links to the development of ocean industries and the blue economy in being recognised as a new area of opportunity to transform and diversify the economy. It connects to developing industries and sectors that extend human development, resources and wellbeing, employment, education and health This also indirectly aligns to the Angola 2025 Long Term Strategy Axis 2 to promote sustainable, diversified economic development that follows environmental sustainability. It correlates to Axis 3 needing the transport, logistics and electricity (offshore oil and gas/marine renewable energy) infrastructure necessary to ensure development. Improving sovereignty and enforcement/control of these resources will further augment Axis 5 for national defence, security and regional cooperation to facilitate peace and stability.

Pilot projects in marine spatial planning and awareness were selected under the MARISMA project in Angola and drafting a marine spatial planning process with blue economy participants. The development of the Marine Spatial Planning Plan is based on the four fundamental pillars of sustainability, namely the ecological, economic, socio-cultural and governance pillars. "Ultimately the purpose of enhancing institutional capacity, training, awareness and the formation of an Angolan MSP is to guide policymakers and other stakeholders for a productive, healthy,

accessible, preserved, safe and conflict-free marine space that is managed in an integrated and sustainable way, economically developed and socially fair for the benefit of all users and who consider the uses, socio-economic and ecological functions of the ocean.” Through stakeholder consultation, interviews and surveys it identified urban expansion, population density growth and coastal development as core pressures. Others include increasing artisanal fishing with illegal fishing gear and methods; and conflicts with artisanal fishermen. Prospects for the blue/marine ocean economy include development of the oil and gas sector and associated activities; potential for increasing industrial fishing (including by-catches) along with a volume increase in commercial cargo ships and passenger transport as well as commercial port and terminal expansion from Cao, Porte Amboin and Dande ports. Tourism remains under-developed with Sangano Beach fibre optic cables to improve telecommunications for tourists and Cabo Ledo Tourism Development Precinct as priorities.

The Blue Economy is briefly identified under section 2.2.5 of Namibia’s National Development Plan (NDP). The Plan focuses on various economic sectors to target physical infrastructure and enterprise development, social transformation of human resources, a sustainable and resilient environment including climate change and other risks, along with ensuring good governance. It identifies the need for long term sustainable allocation and usage of resources including marine ecosystems. The Plan specifically targets that by 2022 a Blue Economy governance framework and Policy will exist with baseline indicators to monitor specific progress and performance. It cautioned the existence of a currently silo based mentality where stakeholders functioned in isolation without a joint cooperative and coordinated approach towards developing the sector. It identified the need for a Blue Economy Policy, a national Marine Spatial Planning (MSP) Document and recognising ecologically or biologically significant marine areas. It wishes to develop freshwater fisheries up to 5000 tons per year.

The 2019 Namibia Blue Economy Policy aimed to provide a unifying guiding policy or regulatory framework to resolve the existing lack of coordination between stakeholders. Aside from identifying specific blue economy activities and related legislation that could potentially influence the development of the blue economy, it identified a sustainable blue economy activity must incorporate certain elements or principles. These include “contributing to a stable marine ecosystem; is inclusive and based on sharing marine natural wealth for current and future generations, is environmentally sustainable based on clean technologies, renewable energy and circular material flows; and is economically sustainable based on good governance and accountable systems.” It focuses on a state oriented rather than private or inclusive stakeholder approach to growth and development. It originally went for one round of public consultation but subsequently has remained within various government departments for further input. However, it has failed to fully consider the emerging trends of sustainable blue ocean economy finance, marine ecological capital in protected areas, regional maritime security implications and to establish systems to climate change, marine pollution, illegal and unregulated fisheries and other emergent risks as identified further in this report. It does identify the need for measures to comply with the Food and Agricultural Organisation (FAO) Code for Responsible Conduct of Fisheries to take measures to resolve these and other threats including regional legal cooperation and information sharing. The policy identified no existing legal or regulatory constraints that would inhibit development of Namibia’s Blue Economy. It established the need to effectively allocate and mobilise resources along with an active communication and dissemination policy to mobilise youth and others to become more interested and aware.

Namibia cites its overall ocean/blue economy principle vision in its National Marine Spatial Planning Document as: “A healthy, safe and well understood marine and coastal environment that is sustainably and transparently governed and delivers optimised social and economic benefits to Namibia.” The recent Namibia Marine Spatial Planning document focuses on incorporating these principles to guide development of various marine/blue economy sector activities including fisheries, defence, environmental protection, geological resource mapping and exploitation, mariculture, marine and cultural heritage, infrastructure, maritime transport and ports, marine and

coastal tourism and seawater abstraction or desalination (Namibia Ministry of Fisheries and Marine Resources 2020). It highlights the need for coordinated, intersectoral coordination among government departments, focused stakeholder engagements and application of scientific and geospatial mapping principles to achieve effective identification of resources available and subsequent requirements or priorities for implementation. These ultimately aim to link previously fragmented approaches towards achieving Namibia's marine/blue economy. Ultimately the MSP framework claims to focus on linking all stakeholders towards attaining social and economic benefits, whilst preserving ecosystem health, responsible research and monitoring and good spatial governance via legal policies and equitable access to resources.

The Namibia Nature Foundation drafted an independent Blue Economy Scoping Policy for the 2019 UK Foreign and Commonwealth Office. It identified the various blue economy activities, policies, institutions, regulatory framework, risks and governance implications. It recommended Namibia's blue economy would gain from improved focused data collection and research in marine spatial planning and integrated coastal zone management, training, coordination of stakeholders and enhanced institutional capacity. It advocated the need to ensure adequate sustainable blue economy investment and finance, especially to support creation of Marine Protected Areas. It is also considered essential to conduct a more comprehensive and effective socioeconomic and ecological valuation of Namibia's marine ecosystem services.

Although South Africa does not currently possess a national, provincial or municipal framework with direct reference to the blue economy, its Operation Phakisa directly focuses on the blue economy. In 2013 South Africa's maritime or blue economy directly contributed 13.6% to GDP prior to developing a formal strategy via Operation Phakisa. It is targeting 12,000 seafarers by 2019, although possessing only 4 registered cargo vessels. South Africa's own response to the global blue economy is pursued under Operation Phakisa, launched by former President Jacob Zuma in 2014. Operation Phakisa aims to generate 1,000,000 maritime related jobs by 2030 from 256,000 in 2010, adding R177 billion to GDP. Four target areas of offshore oil and gas with 30 new oil wells; marine transport and ports; industrial aquaculture; maritime manufacturing with ship repair; tourism and 22 new marine protection services/marine protected areas (MPA's) in 10 years. Opportunities and investments cited under the African Integrated Maritime Strategy and Operation Phakisa including ship repair, maritime education, aquaculture, marine tourism, oil and offshore gas. It claims to maintain and refurbish existing ship repair facilities at all ports. It seeks R2 billion co-funding, targeting 20,000 jobs by 2023 and R6.5 billion projected GDP contribution. Further commitment to the maritime sector, (although not formally defined as a "blue economy strategy" with a specific method framework), is echoed through the 2014 White Paper on National Environmental Management of the Ocean, Comprehensive Maritime Transport Policy 2017 (for marine ecological protection, safety and security); National Transport Master Plan 2050, National Industry Policy Framework (marine manufacturing is especially highlighted), National Transport Policy and KwaZulu-Natal Integrated Maritime Strategy. It extends to the forthcoming eThekweni Blue Ocean Economic Framework and 2030 National Development Plan and New Growth Path. The South African Maritime Safety Authority (SAMSA 2013) proposed utilising African shipping and coastal trade to support infrastructure development and the growth of the African maritime economy. South Africa has also signed a Memorandum of Understanding with China in regard to the ocean economy.

The national port authority, Transnet, is undertaking expansions for 7 ports including more dredgers, tugs and pilots requiring servicing and construction. Durban's future as the most significant of African ports is challenged further by the ascendancy of Post-Panamax size vessels (over 350 metres long, with up to 12,000 containers and a 170,000 deadweight ton carrying capacity), with the potential for ever greater economies of scale, efficiency and productivity, but also increased externality costs for users and seaports able to permit their entry. Its existing port capacity denies their potential macroeconomic benefits, especially from significant forecasted international trade growth and possible container demand exceeding 12 million TEUs by 2044 (Dyer 2015). Geophysically, Durban's

present harbour cannot expand, currently encircled by the city and the Indian Ocean. Transnet has committed to investing a total of R250 billion up to 2050, to convert the former Durban International Airport (DIA) and even potentially the Bayhead Basin, railway marshalling yard sites into further dugout port extensions to reach an annual 20 million TEUs of cargo handling capacity. Until 2019, R33 billion will be invested in enhancing existing port container throughput capacity to its maximum potential of handling 4.8 million TEUs at most, as another constraint requiring a physical port expansion. While these may potentially resolve current problems of port-related capacity constraints; the DIA site alone is projected to cost R100 billion over the next twenty five years to develop. Due to budgetary; environmental, zoning and local community tensions; this development has been paused. Yet Transnet still propose to invest R229 billion in overall infrastructure and services, excluding R750-R800 million in education and training. SA Navy plans exist to refurbish the Naval Station at Durban's Salisbury Island, currently home to 4 vessels, to a full naval base, after being demoted in 2002.

Although many policy documents and initiatives in South Africa lack specific reference to the blue economy, the need for specific clusters and collaborative frameworks was highlighted at a 2017 South African Maritime Industry Conference in Port Elizabeth (SAMIC 2017). The report estimated Operation Phakisa had directly established over 6,952 jobs and R7,323 billion of investment from 2014-2017, in addition to a currently sustained 427,000 jobs. It also proposes empowering women and youth. Maritime skills, research and training initiatives have been undertaken by SAIMI, SAMSA, Department of Transport and various other stakeholders (Dyer 2017). However only 203 seafarer cadets currently exist. In 2014 a South African International Maritime Institute was also founded to cooperate with Operation Phakisa under the Presidency, in spearheading the ocean/blue economy. Specific projects included the refurbishment of 12 small fishing harbours, new Aquaculture, Marine Spatial Planning and Cabotage Bills; acquiring the SA Agulhas for seafarers and other initiatives. In 2015 Vuka Marine Holdings registered the first 4 South African owned cargo ships since 2009. COEGA are investing in an LNG to Power Plant and terminal, Cape Town its Burgen fuel storage, whilst SA Shipyards are building a 147 metre LNG barge in Durban. Bunkerage services, Durban and Cape Town Cruise terminals and a Marine Tourism Framework have also been investigated separately, although not specifically mentioning the blue economy. As Section 1.4 will evaluate, 35 aquaculture projects have been attempted along with an Aquaculture Development Fund and Development Zones. DEA are forming a National Oceans and Coast Information System. CSIR have published a centralised Maritime Research, Innovation and Knowledge Road Map and document of core blue economy stakeholder contacts. SAMIC (2017) conclude in the need to connect all stakeholders to minimise maladaptation, inaction and opportunity costs or superfluous duplication and wastage of resources. Popular participation and awareness are regarded as imperative for a blue economy framework, as Transnet are pioneering with its inaugural Port Festivals.

South Africa also has experienced limited vocational guidance and skills shortage for those seeking to participate in the blue economy. Those with the capacity to contribute, including many financed to study abroad; are invariably not active members in determining blue economy strategy frameworks or plans for any identified related value chain or initiative such as South Africa's proposed port expansion and Cruise Terminal developments. No central database exists of blue economy stakeholders, initiatives; research and projects; policies and ecological information/opportunities, aside from the 2019 recent, private website approach or www.blueeconomyfuture.org.za and the related ocean economy policy documents on the South African Presidency website. The private sector remains notably silent or reluctant to engage in any blue economy mapping or strategy framework formation; unlike other international counterparts. South Africa's own Comprehensive Maritime Transport Policy completely ignores reference to both the blue/ocean economy and Operation Phakisa but aims for a globally competitive port system; effective maritime transport; small harbours; coastal shipping and cabotage. It especially emphasises the need for mortgage financing, taxes and other incentives to establish this. Yet, endorsing the Blue Oceans Economic Framework would facilitate not only safety; security and development of people, ships and cargo but also the

marine and coastal environment. A localised shipping fleet would reduce distances needed for cargo and potential associated adverse externality costs, becoming more eco-conscious if sufficiently modernised.

South Africa's Marine and Antarctic Research Strategy, although consistent with many blue economy principles, is weakened as a coordinating mechanism through specifically ignoring its definition, scope and principles. It aims to ensure the capable management and survival of marine and polar resources in order to facilitate research, improve South African's quality of life, create employment and inform society of their intrinsic value in conservation. It prioritises ocean and marine ecosystems under climate change; Earth systems observations; Ecosystems, biodiversity and bio-discovery; human enterprise; innovation and development. Its aims - to devise national marine and coastal information systems, networks and infrastructure - could be correlated with international methods towards the blue economy, proposing an initial quantification of all potential benefits, values and risks for the marine environment, prior to developing a sustainable pathway forward. It has previously invested in research vessels, bases, robotic arrays, drones, satellites, technology and laboratories to aid understanding. It is investigating the marine bio-economy and has possibilities of generating innovation in other Operation Phakisa and blue economy emerging areas.

From June to September 2020, Durban city also became the first city in the Southern Hemisphere/Sub Saharan Africa to develop its own eThekweni Municipality/Durban City Blue Oceans Economic Framework. A minimum of 10% of its continental maritime domain is advised to be protected by 2020 and 30% by 2030 in previous research. (Harris and Lombard 2018). South Africa needs to ensure its new Marine Spatial Planning Bill and proposed investments in navy and coastal protection are sufficiently adequate to protect any existing or future investment in a blue economy framework and associated activities under Operation Phakisa. Existing fisheries still need adequate monitoring to avoid a several decade, historic decline, especially for KwaZulu-Natal.

Although South Africa does not specifically connect to the blue economy, it has undertaken several strategies and research sources focusing specifically on maritime human capital, education and training as essential towards developing Operation Phakisa. These need effective reviewing to specifically ensure participants are sufficiently aware, experienced and qualified towards all requirements and priorities of eThekweni's and other Blue Ocean Economic Frameworks both nationally and globally. One maritime sector skills report identified the existing scarcity of educational capacity to create Operation Phakisa without sufficient, subsequent investment (Human Resources Development Council of South Africa 2014). It reviewed existing institutions including the 2015 proposed South Africa International Maritime Institute, originally envisioned as the progenitor of maritime education and research across South Africa. It advised more specialised qualifications, maritime high schools, awareness programmes and bursaries, without directly mentioning how it would attain the core enablers needed for blue economy growth to emerge and thrive. This is also conspicuously absent in the National Skills Development Strategy, which identifies existing challenges of a limited work ethic and motivation, skills capacity, funding, experience and entrepreneurship.

South African examples of the blue economy mostly include aquaculture case studies in the Western and Eastern Cape. Devising a Blue Oceans Economic Framework is increasingly perceived to indicate how related activities can benefit from the Fourth Industrial Revolution (University of Stellenbosch Business School, 2017). Total African aquaculture expanded from 558,888 to 1,615,608 tons between 2004 and 2013. Yet fisheries and aquaculture contribute merely 0.1% to local GDP, R6 billion and 108,000 jobs. 89% of fishing stocks are collapsed. South Africa has invested in the "Working for Water and Fisheries" initiatives to improve water conservation and management practises along with a National Aquaculture Strategic Framework, an Aquaculture Management Chief Directorate under the Department of Agriculture, Forestry and Fisheries. Economic spill-over multipliers in

developing aquaculture are projected to benefit bio-refinery and biofuels, biotechnology; synthetic biology, genetics, protein transition, sensor technology, logistics and renewable energy plus manufacturing simultaneously.

From 2015-2019, Operation Phakisa aimed to produce 15,000 additional jobs with 23 pilot projects, adding R3 billion to local revenue and 20,000 tons of fish. The Aquaculture Competitiveness Improvement Programme identified constraints in training, supporting rural infrastructure, access to finance; excess legislation and bureaucracy; high production costs, water security, problems of accessing quality inputs and involvement by women, youth and those with disabilities. Its budget expanded slightly from R32,290,000 in 2015/2016 to R36,152,000 by 2017/2018. South African aquaculture possessed 34 marine and 161 freshwater farms in 2012, employing 2,227 people, 26% in the Western Cape, 22% Mpumalanga, Gauteng 12% and Limpopo 10%. Few exist in KwaZulu-Natal. The Western Cape have developed a specific aquaculture market analysis, development initiative and strategy including research digital technology, supportive networks, improved transparency and product quality, public feeds, cold stores, coordinated marketing and input supplies. An extensive private review of South Africa's aquaculture sector called "Harvesting the Coastal Sector" was conducted by Dyer in 2017. By 2019 the sector aims for an additional 17,644 tonnes, contribution R1,841,000,000 and 2,584 new jobs. The industry has tried pilot projects and small-scale aquaculture farms for a diversity of species including trout (47 farms), tilapia, abalone, dusky kob, oysters, mussels, oysters and catfish (Britz and Venter 2017). Other new projects yet to be implemented include crayfish and salmon. The Presidency website is proposing several numerous initiatives. To speed up 1-3 year delays in establishing an aquaculture farm (890 days to 240 days), an Inter-Department Authorisation Committee has been initiated and developed along with greater marketing and awareness efforts. The Aquaculture Development Fund is planned to be endowed with R500,000,000. A centralised market database of all suppliers has also been proposed but not implemented. Yet there are no aquaculture research officers, state aquatic vets and extension services present in 6/9 provinces, not even KwaZulu-Natal, only the Western/Eastern Capes and Limpopo. Under Operation Phakisa, South Africa's blue economy potentially expands to the offshore oil and gas sector. Projected reserve estimates include over 9 billion barrels of oil, excluding the February 2019 discovery offshore the northeastern South African coast. It extends to 11 billion barrels of natural gas. Table 4.2 summarises core national initiatives and pilot projects from 2015-2021. Targets include 130,000 jobs and 30 wells plus locally owned and repaired oil rigs along with a seismic research vessel under the local flag. Yet this is estimated to cost around R3-5 billion. Potential production could exceed over 370,000 barrels per year (South Africa Presidency 2014).

This marks a comparatively recent phenomenon for a nation whose maritime interests were more traditionally orientated towards fisheries, ports, coastal, cruise and marine tourism. During the civil conflicts between Renamo and the Frelimo government between 1975-1992, fisheries provided one of the main staples of government revenue, although comparatively little value adding via aquaculture, beneficiation and marine biotechnology emerged. Recent offshore oil and gas exploration has signalled further potential prospects in Mozambique's Exclusive Economic Zone. In response to the global and African regional interest in the blue economy, President Felipe Nyusi of Mozambique announced the POLMAR Strategy in 2017. Promulgated in 2018 this aims to "promote a safe sea, managed in an integrated and responsible manner, with social and economic benefits to Mozambique towards sustainable development. In November 2019 the World Bank announced the Pro-Azul Strategy and Blue Economy Development Fund to provide a practical road map of core actions and recommendations to implement the proposed blue economy, publishing a tender to appoint certain consultants. In May 2019 Cyclones Idai and Kenneth temporarily disrupted economic activities for the port of Beira, reminding stakeholders of the potential costly disruption of failing to prioritise climate change and the IPCC projected increase in the frequency, duration and intensity of climate related natural disasters such as floods, cyclones, droughts, landslides, sea level rise, gales, species migration, extinction, ocean acidification, biodiversity loss and heatwaves.

Although it spontaneously emerged and dissipated in a fortnight, Cyclone Idai with over \$7 million in direct damage, 215+ deaths and over 90% damage to the crucial port city network of Beira, Tete province, central Mozambique; serves as a poignant reminder of not to underestimate global climate change. Infrastructure, assets, humans and other species faced up to 195 kph/120 mph winds and 200 millimetres of rain (8 inches). Mozambique previously lost over 200 people in 2017's Cyclone Dineo and over 100 people in 2000's Cyclone Leone-Eline. Tropical cyclones, storms, floods, droughts, heatwaves, landslides, species migration, sea level rise, temperatures and extreme events are projected to rapidly increase in frequency, duration and intensity according to the Intergovernmental Panel on Climate Change and other credible sources. Whilst Mozambique's and neighbouring Malawi, Madagascar, South Africa and Zimbabwe maritime stakeholders are still quantifying the cost and needing aid; it is the need to mobilise human proactive awareness and concern; that is the true lesson of this disaster.

Cyclone Idai formed from 4th-14th March, striking Beira on the 4th and 15th/16th March. Airport flights were grounded, debris, vegetation and collapsed infrastructure/vehicles paralysed road/rail links and the port is experiencing delays, given the priority for humanitarian logistics. Over 500,000 citizens lost telecommunications and electricity connections, whilst electricity disruption affected as far as South Africa losing 900 megawatts from Cahora Bassa hydroelectric plant disruption. Mozambique's government, the Red Cross, BBC News, Al Jazeera and other media/aid agencies have reported the need for an initial \$17.5 million of aid to reconstruct after flooding damage. 420,000 acres of damaged crops severely affect Beira port's grain export capacity and local citizen's food security. Each day of inoperation prevents 5-10,000 tons of grains feeding citizens and livestock. Beira port forms a crucial nexus of Mozambique's economic hinterland and its coastline. Initial cyclone damage could congest Container Terminal capacity of 400,000 TEU's per year, 10,000,000 tons of general cargo and grain terminal capacity of 50,000 MT per year.

Therefore, Mozambique's blue economy offers potential via recovery and myriad emerging blue economy opportunities, further motivating the need to create a blue economy strategy, roadmap, Action Plan and other practical outcomes, as envisioned by the Terms of Reference in this proposal. This aims ultimately to fundamentally assist core stakeholders to attain a sustainable blue economy future, climateproofing as much as practically possible, against projected climate change and other emergent risks. This research will aim to assist POLMAR to implement its 7 core pillars: (A) Governance and Legal Framework; (B) Inter-Institutional Coordination; (C) Coastal and Marine Environment; (D) Economic Development; (E) Territorial Development; (F) Human Capital Development and (G) International Cooperation. It aims to ensure a more inclusive social stakeholder engagement process towards the 2020-2025 Pro-Azul Strategy and implementation of UN Sustainable Development Goals, especially 13 and 14. As declared by the President, this strategy also aims to support a strengthening of the state's capacity in maritime governance, including the defence of the environment, the preservation of territorial integrity and the defence of national sovereignty against threats such as climate change, piracy and poaching/illegal and unregulated fishing.

3.8: West Africa

The blue/ocean economy sector in West Africa has failed to receive the same priority and attention as in other regions. In 2019 Sky Fox aimed to create 20,000 tons of aquaculture fished species in landlocked Burkina Faso by the end of 2020, by investing in the sector. In December 2020 Nigeria announced plans to create a new Regional Centre of Aquaculture Excellence with a 50,000,000 fish hatchling capacity. Nigeria is pursuing its own rapid cabotage policies in developing its fleets. It is also launching in 2021 a \$195,000,000 Deep Blue Initiative to help improve maritime security and surveillance against heightened risks of piracy and illegal fishing in the Gulf of Guinea/its Exclusive Economic Zone. Benin and Gabon are forming an alliance with NGO Sea Shepherd to

respond to emergent threats. Liberia's registered shipping fleet is expanding rapidly (3,521 vessels and 3.53% of world total). For ocean renewable energy, a pilot study in Nigeria has estimated how hydrokinetic energy via the Benue/Niger rivers could reduce installation costs of electricity from \$7,900 per installed KW to \$2,500 (Eme et al. 2019) with savings on imported fuel and logistics as co-benefits. Marine conservation is gradually receiving attention, aside from work by Conservation International investigating Liberia's coastal mangroves. Since June 2020, Senegal added 3 new community managed, marine protected areas. In September 2020, the Ivory Coast created 5 marine protected areas. In November 2020, the UK overseas territory of Tristan da Cunha committed over 700,000 km² of ocean towards conservation.

Historically, Liberia's ocean economy sector is dominated by minor fishery and port/logistics related industry activities. It also has an extensive seafaring history, aided by its comprehensive ship registry as one of the top three in the world with over 4,400 vessels, extending back over 70 years. It includes over 12% of the global shipping fleet and 170,000,000 general tons with 25 offices. The Liberia Maritime Training Institute is a core local and regional area education centre for vocational seafarers. During COVID19, Liberia was the first global nation to convert to remote ship registry inspections. From 2014-2016 Conservation International and GEF conducted a biodiversity project to understand and investigate protection of coastal mangroves. From November 2017 Sea Shepard and the Liberian Armed Forces started developing armed sea patrols to work with communities against illegal, unreported and unregulated fishing. Fishery image examples appear in Images I-IV below. From 2018 the World Bank-sponsored West Africa Regional Fisheries Project (WARFP) aims to inspire nine countries, from Mauritania to Ghana, allocated US \$14,000,000 to Liberia. Fisheries too remain valuable employing over 35,000 people. In 2017 Liberia had 390 fishing vessels producing over 2,200 tons of fish each year. In 2017 exports contributed \$600,000 versus imports of US \$7,300,000 and 50,000 tonnes of fish.

Although Liberia has an extensive maritime, marine and coastal legacy since its foundation in 1847, it has traditionally not focused on this sector over its more recent past. It has over 4,000 registered flag state vessels and 3,600 domestic fishing vessels, a Maritime Institute and over 35,000 marine dependent tourists but aims to reach 100,000 by 2025 and over \$200,000,000. Over \$30,000,000 of potential additional fisheries and aquaculture revenue has been identified by NAFAA, and IUU fisheries alone remove over \$74,000,000 each year. Since 2019, and Conservation International/Swedish Embassy's successful hosting of an inaugural Blue Oceans Conference reaching out to over 300 stakeholders, awareness has started to change, most notably in expressions of more will and interest to embark Liberia in this world odyssey and socioeconomic/ecological transformation. In Liberia, although no formal government attention has yet to officially support a research and policy, increasing awareness, interest and previous donor-related projects, culminating in the 2019 Blue Oceans Conference in Monrovia and the need for swift post-COVID, post-Ebola socioeconomic recovery. In 2019 the nation's pioneering Blue Oceans Conference, hosted by CI and the Swedish Embassy attracted favourable media coverage and interest from over 300 participants. As a direct implementing output, a related consultancy/study was identified and awarded to Blue Economy Future.

The Cape Verde Government's blue economy approach includes improved port facilities e.g. the container, commercial fishing and cruise terminal. It extends to augmenting naval construction/repair facilities from 2,000 to 3,800 tons (12 million euros), creating an Oceanarium, port logistics centre and real estate (Cape Verde Government, 2018). It possesses 1,717 fishing vessels. Mostly it envisions itself as a passenger and maritime service hub, experiencing 22.6% trade growth in 2017. Projects favour a public-private partnership. A new cruise terminal is anticipated to attract 30 million euros in investments, generating 120-215 jobs, excluding 45-90 euros per passenger per visit. A 17,000,000 euro Oceanarium hopes to attract 100,000 tourists per year, whilst facilitating marine environment education. The port aims to attract 12,000,000 euros in investment primarily for new cranes and other equipment whilst a 5,000,000 euro container freight station could support up to 2,000 jobs. A 3.3 hectare

waterfront real estate commercial and residential precinct could support 150 direct and 250 indirect jobs, contributing over 12,000,000 euros.

2.9: USA

Greater cooperation over individual US regions' mutual abilities to plan and modify ocean/waterway usage was formed with the 2010 National Ocean Policy, Implementation Plan. Conversely, the US have established a National Ocean Economics Programme, targeting "*aspects that contribute or rely upon healthy oceans and coasts that simultaneously serve or have the potential to serve as major economic drivers in their own right: sustainable fisheries, recreation and tourism, coastal ecosystem restoration, and offshore renewable energy development*" (Conathan and Moore 2015). It seeks sufficient information for the most capable long-term decision making for communities and policy makers. San Diego and the Maritime Alliance have formed a joint 2012 partnership in a blue economy cluster, which could be specifically leveraged in other maritime clusters being developed to occupy a similar role for common marketing, economies of scale and support. In 2018 according to the National Oceanographic and Atmospheric Administration (NOAA), the American blue economy supported 2,300,000 jobs, and contributed approximately \$373 billion to the nation's gross domestic product through activities such as tourism and recreation, shipping and transportation, commercial and recreational fishing, power generation, research, and related goods and service. 40% of inhabitants reside in coastal areas.

The USA are monitoring progress with the recently formed National Ocean and Coastal Economics Monitoring programme. Alternatively, Washington State specifically aims to be the geographic centre to attract all blue economy sectors in the USA by 2050 through specific investor friendly marketing solutions, infrastructure partnerships, tax initiatives, research and development tax credits. It aspires to: "*The development of maritime business, technology and practises that promote a sustainable future contributing to ecological health, thriving communities and economic growth.*" As part of this it is selecting the development of entrepreneurs, incubation and commercialisation hubs and workforce education. One prototype included electrifying of three ferries, saving 9.5% in total ferry emissions and 3.2 million litres of fuel per year. It recognises the significance of networking, creating a Maritime Innovation Centre, Port decarbonisation and fiscal incentives such as a Clean Energy Fund and Carbon Tax.

The US Middlebury Center for the Blue Economy has examined the economic vulnerabilities to sea level rise in two major studies. One was conducted for the Mid-Atlantic Regional Council on the Ocean (MARCO) which examined the socio-economic vulnerabilities for sixty-three counties stretching from Montauk Point on Long Island to the upper Chesapeake Bay. This study examined not only such traditional industries as fishing and ports but also tourism, infrastructure, and the specific issues for vulnerable populations. The other study was for the San Diego Regional Climate Collaborative which incorporated the latest modelling of the combination of sea level rise together with storm and wave intensity to identify the potential effects on the San Diego County regional economy.

More recently in 2021, US Blue Economy initiatives included the January release of the NOAA Blue Economy Strategy which projected growth in areas such as marine transportation, ocean exploration, seafood competitiveness, tourism and recreation, and coastal resilience. In March 2021 the USA authorised expansions in offshore wind energy area in the New York Bight. This estimated up to 25,000 development and construction jobs, 4000 in maintenance from 2022 to 2030, as well as an additional 7,000 jobs in communities. The target aims to double offshore wind energy capacity in the country in the next few years. In April 2021 civil society launched a set of lobbying days for oceans and climate to Congress. The Joe Biden Administration also announced climate

and marine/coastal ecosystem restoration under the Civilian Climate Corps and protect 30% of land and oceans by 2030 in the nation and its Exclusive Economic Zone.

Canada investigated in maritime safety and security via the 2016 Oceans Protection Plan. The sector estimated at contributing over \$4,500,000,000 each year to the economy, is guided by the 2040 Blue Economy Strategy which focuses on 6 core thematic areas related to focusing on seafood sustainability in markets and supply chains. Canadian ocean-based sectors currently account for about 300,000 jobs and just \$31,700,000, 1.6 per cent, of the country's GDP. Under the joint federal-B.C. Salmon Restoration and Innovation Fund, \$142,000,000 is being invested over five years in initiatives like salmon habitat restoration. The financial sector are also investigating the concept of a Canadian Global Blue Ocean Fund concept. British Columbia are investing over \$20,000,000 i the Fisheries and Aquaculture Clean Technologies Programme. On 23rd February Canadians were asked to give their feedback related to the blue economy and oceans via an online stakeholder engagement strategy to influence the policy. In March 2021 Canada announced investing in a thoroughly modernised oceanographic research vessel. The Canadian government also committed to providing CAD 4,000,000 (USD 3,100,000, EUR 2,500,000) to the World Bank PROBLUE fund to help developing countries create sustainable ocean plans. Since 2012 it has also heavily invested in small harbours and marinas as catalysts of local development. It has also promoted entrepreneurship and specialist network in an Ocean Supercluster.