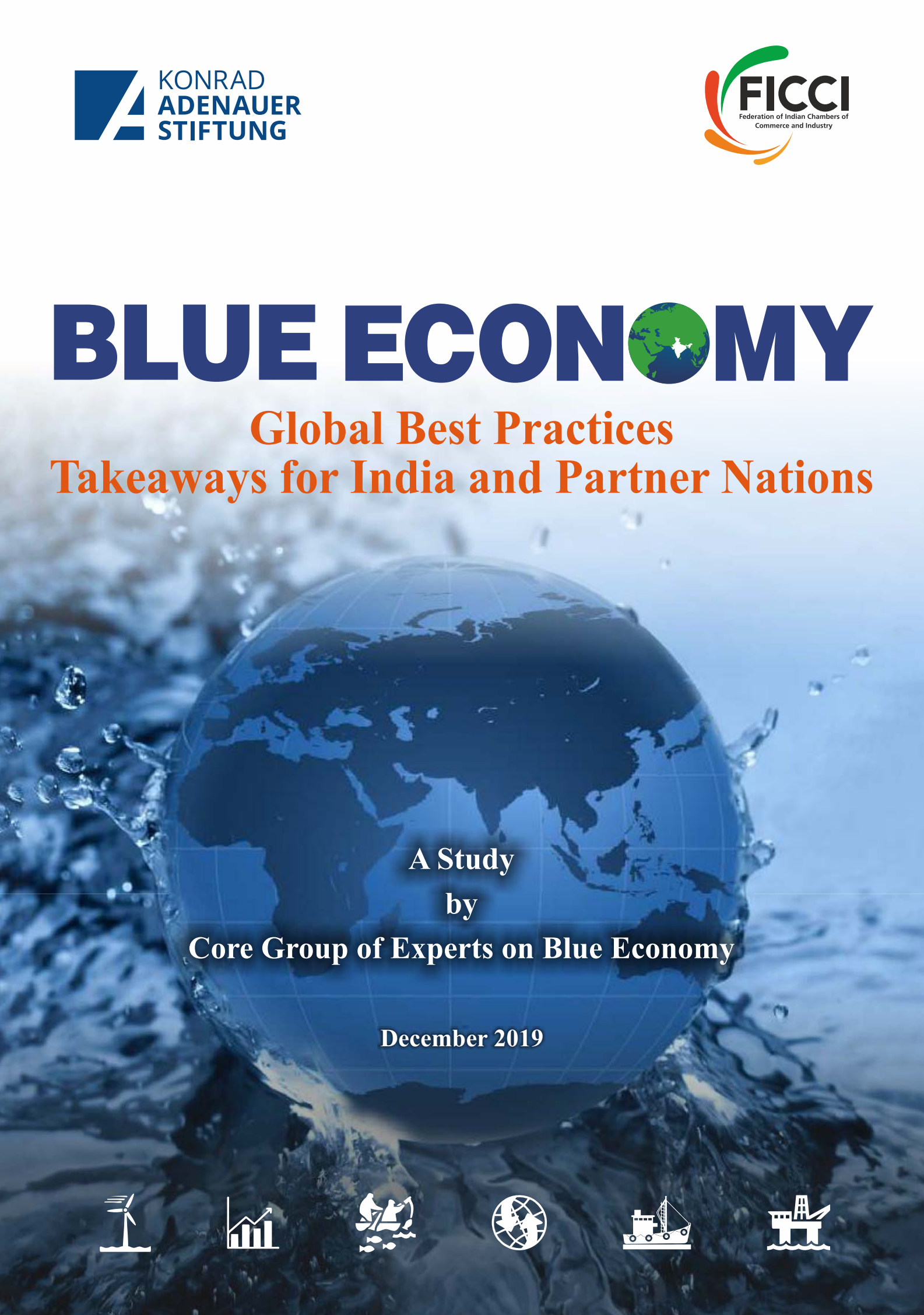
KONRAD ADENAUER STIFTUNG

FICCI
Federation of Indian Chambers of Commerce and Industry

BLUE ECONOMY

Global Best Practices
Takeaways for India and Partner Nations



A Study

by

Core Group of Experts on Blue Economy

December 2019

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ABEF - Africa Blue Economy Forum
ADR - Alternative Dispute Resolution
AI - Artificial Intelligence
AIS - Automatic Identification System
APEC - Asia Pacific Economic Cooperation
ASEAN - Association of Southeast Asian Nations
BE- Blue Economy
BEC - Blue Economy Conference
BIMSTEC - The Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation
BMBF - Bundesministerium für Bildung und Forschung/ German Federal Ministry of Education and Research
BMI - Bundesministerium des Innern/ Ministry of the Interior, Building and Community
BOT - Build, Operate and Transfer
BRICS - Brazil, Russia, India, China, and South Africa
BSH - Bundesamt für Seeschifffahrt und Hydrographie/ Federal Maritime and Hydrographic Agency of Germany
CAA - Coastal Aquaculture authority
CAGR - Compound Annual Growth Rate
CCSNEI - Classification and Code Standard of National Economy Industry
CEZ - Coastal Economic Zones
CFS - Container Freight Stations
COP- Conference of Parties
CPS - Cyber-Physical System
CSIR - Council of Scientific and Industrial Research
CWMI - Composite Water Management Index
DMFC - Delhi-Mumbai Freight Corridor
DOALOS - Division for Ocean Affairs and the Law of the Sea
DWT - Deadweight Tonnage
EAFRD - European Agricultural Fund for Rural Development
EC - European Commission
ECDIS - Electronic Chart Display Systems
EEZ - Exclusive Economic Zone
EMFF/ FEAMP - European Maritime Fisheries Fund
ERDF - European Structural and Investment Funds
ESCAP - Economic and Social Commission for Asia and the Pacific
ESF - European Social Fund
ESSO - Earth System Science Organization
EU - European Union
FAO - Food and Agricultural Organisation
4IR - Fourth Industrial Revolution
FY - Fiscal Year
GDP - Gross Domestic Product
GGF - Green Growth Framework
GMDSS - Global Maritime Distress and Safety System
GOI - Government of India
GPI - Global Progress Indicators
GPS - Global Positioning System
GVA - Gross Value Added
GW - Giga Watt
ICD - Inland Container Depots
ICEGATE - Indian Customs Electronic Gateway
ICT - Information and Communications Technology
IFC - International Finance Corporation
IFC-IOR - Information Fusion Centre-Indian Ocean Region
IISD - International Institute for Sustainable Development
IMAC - Information Management Centre
INCOIS - Indian National Center for Ocean Information Services
INTG - Integrated National Waterways Transportation Grid
IORA - Indian Ocean Rim Association

ISA - International Seabed Authority
IVG - Industrial Vortex Generators
IWT - Inland Water Transport
KSIDC - Kerala State Industrial Development Corporation
LDCs - Least Developed Countries
LNG - Liquefied Natural Gas
MDGs - Millennium Development Goals
MEA - Ministry of External Affairs
MEDC - Maharashtra Economic Development Council
MMT - Million Metric Tonnes
MPAs - Marine Protected Areas
MPEDA - Marine Products Exports Development Authority
MOSS - Models of Success and Sustainability
MSME - Micro, Small and Medium Enterprises
MSP - Marine Spatial Planning
MSR - Marine Scientific Research
MSY - Maximum Sustainable Yield
MT - Metric Tonnes
NAICS - North American Industrial Classification System
NDRC - National Development and Reform Commission
NGRI - National Geophysical Research Institute
NINI - National Inland Navigation Institute
NIOT - National Institute of Ocean Technology
NITI Aayog - National Institution for Transforming India
NMF- National Maritime Foundation
NOEP - National Ocean Economics Program
NPMF - The National Policy on Marine Fisheries
NSDP - National Sustainable Development Plan
OEAS - Ocean Economy Accounting System
OECD - Organisation for Economic Co-operation and Development
ONGC - Oil and Natural Gas Corporation
ORF - Observer Research Foundation
PEMSEA - Partnerships in Environmental Management for the Seas of East Asia
PIDF - Pacific Island Development Forum
PIDS - Pacific Island Developing States
PPP - Public Private Partnership
RDI - Research, Development and Innovation
RIS - Research and Information System for Developing Countries
ROVs - Remotely Operable Vehicles
SAGAR - Security and Growth for All in the Region
SDGs - Sustainable Development Goals
SIDS - Small Island Developing States
SME - Small and Medium Enterprises
SOA - State Oceanic Administration
TERI - The Energy and Resources Institute
TEU - Twenty-Foot Equivalent Unit
UNCLOS - United Nations Convention on the Law of the Sea
UNCSD - UN Conference on Sustainable Development
UNCTAD - United Nations Conference on Trade and Development
UNWTO - United Nations World Tourism Organization
VDR - Voyage Data Recorder
VIF - Vivekananda International Foundation
VPT - Vortex Processing Technology
WACS - Wireline Autonomous Coring System
WBG - World Bank Group
WOA - World Ocean Assessment
WOC - World Ocean Council
WWF - World Wide Fund

India's Vision for Blue Economy

"To me the Blue Chakra or the wheel in India's National Flag represents the potential of Blue Revolution or the Ocean Economy. That is how central the ocean economy is to us."

Shri Narendra Modi, Prime Minister of India (Mauritius, March 12, 2015)

"We must focus upon developing our maritime resources and Blue Economy. We should empower our fishermen community. Our country will have to boost its export. Let us make every effort to reach the global market."

Shri Narendra Modi, Prime Minister of India (Independence Day Speech, August 15, 2019)

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Blue Economy

With the massive coastline of 7,500 kilometers, Blue Economy has the potential to serve as growth driver for the India Economy. "Blue Economy – Best Practices: Takeaway for India and Partner Nations" is a comprehensive study which identifies priorities and issues and recommends policy measures for accelerating the growth and capacity expansion in this sector. I'm happy that FICCI has chosen to focus on this emerging area.

Rajiv Kumar

Dated : 16th November, 2019

स्वच्छ भारत
एक कदम स्वच्छता की ओर

Message

Mr. Peter Rimmele

Resident Representative

Konrad Adenauer Stiftung

The protection of the world's oceans is a global challenge and each country - even a landlocked one - has to contribute towards finding solutions to this issue. The concept of Blue Economy is certainly well equipped to tackle this global challenge by providing a unique and highly relevant approach which combines economic aspects with maritime sustainability.

Maritime-related production is an integral part of the German economy. While it is crucial for the German economy that this sector is promoted further in future, the German government has also recognized the importance of preserving our oceans' sensitive ecosystems and contributing as well as committing to a sustainable use of maritime resources. This is why Germany is one of the largest contributors to the "Blue Growth " of the EU as a part of the long term strategy to support sustainable growth in the marine and maritime sectors as a whole.

Seas and oceans are drivers for the European economy and have great potential for innovation and growth. It is the maritime contribution to achieving the goals of the Europe 2020 strategy for smart, sustainable and inclusive growth. Furthermore, with the Maritime Agenda 2025, the German government has for the first time, developed a long-term strategy for this particular sector.

In the scope of the Fifth Indo-German Intergovernmental Consultations in November 2019, both Chancellor Angela Merkel and Prime Minister Narendra Modi have highlighted their commitment to Sustainable Development Goal 12 (Responsible consumption and production) by encouraging the adoption of resource efficient and sustainable approaches as well as the usage of technology-based solutions in cooperation with all stakeholders. The ongoing Indo-German cooperation in the Blue Economy sectors as well as the commitments of other countries and multilateral organizations gives me hope that in the future, we will find a way to manage maritime-related production sustainably together. However, there is still a lot to be done.

This report marks an important step towards increasing sustainability in our oceans. I am very proud of what FICCI and the Konrad-Adenauer-Stiftung have accomplished and I feel certain that this report will prove immensely useful for researchers and policy makers alike.

December 2019
New Delhi

Message

Mr. Sandip Somany

President FICCI

Blue Economy is a new paradigm in the development discourse, which accords equal weightage to economic growth and environmental sustainability.

For India, Blue Economy assumes high priority. This has been expressed through the vision of Prime Minister Narendra Modi for 'Security and Growth for All in the Region' (SAGAR) and comparison of the Blue Chakra of India's National Flag as representative of the potential of India's Blue Economy. This vision is a beacon for all stakeholders to realise the true development potential inherent in India's coastline of 7,500 km, the vital network of inland waterways, direct sectoral synergy and cross-sectoral multiplier effect on inclusive growth and employment.

FICCI's endeavour is to complement and support this vision to define in a proactive manner, the opportunity and responsibility of Indian industry towards Blue Economy. As India's national industry association, we endorse the growth of Blue Economy in a sustainable, inclusive and people-centred manner.

FICCI's initiative on Blue Economy is aimed at the creation of knowledge, advocacy and business opportunities platform for diverse stakeholders both within and outside the country. FICCI Taskforce on Blue Economy constituted in 2016 comprising eminent experts and FICCI Research Team, produced 'Blue Economy Vision 2025 - Harnessing Business Potential for India Inc and International Partners'. This knowledge report was released in 2017 and presented at various platforms in India and abroad.

In 2018, FICCI carved out a Core Group of Experts on Blue Economy from the Taskforce to deepen the initiative. Along with long-standing institutional partner, Konrad Adenauer Foundation, it is a privilege for me to present the findings of the Core Group captured in the publication titled 'Blue Economy – Global Best Practices: Takeaways for India and Partner Nations'.

I specifically acknowledge the Diplomatic Missions in India for their generosity with time and invaluable guidance to identify best practices in their respective countries across Europe, Americas, Africa, Asia-Pacific and IOR. Enthusiastic engagement by Ministries of Govt of India and the State Governments of Kerala, Andhra Pradesh and Gujarat have also been invaluable. I am happy to learn of the keen interest evinced by other coastal states of India in our work, especially the states of Maharashtra, Tamil Nadu and West Bengal, who have also been part of previous consultations. Indian industry contributed by sharing their perspective on the policy support required to create a long-term business engagement in Blue Economy sectors.

I trust that you would find resonance with the recommendations that span strategic, institutional and industry aspects. As stakeholders in Blue Economy of India, we can make a positive difference to the development of Blue Economy and support India's endeavour to expand and contribute to the international discourse on Blue Economy.

December 2019
New Delhi

Messages

H.E. Ambassador Dr. Nomvuyo N. Nokwe
Secretary General, IORA

The report will definitely fill a gap in our knowledge about the Blue Economy and it will further harness and enhance the promotion of Sustainable Blue/Ocean Economy necessary for governance and regional cooperation that will unleash job creation and growth in both in the IOR and in the Member States.

H.E. Ambassador Mohammad Shahidul Islam
Secretary General, BIMSTEC

FICCI's publication titled 'Blue Economy – Best Practices: Takeaways for India and Partner Nations', brings forth immense business opportunity that lies in the oceans. This important study is relevant for businesses of both Indian and other nations of the Bay of Bengal region in bolstering their collective endeavour for sustainable development.

Mr. Paul Holthus
Founding President and CEO, World Ocean Council

This important Blue Economy report provides a comprehensive review of India's significant marine area and resources and ocean economic development potential. It sets the stage for realizing the substantial benefits possible from the country's extensive coastline and EEZ, while also addressing the imperative for responsible, sustainable development.

Prof. Chandra Sekhara Rao Nuthalapati
Institute of Economic Growth (IEG)

This report is the first of its kind in India on the evolving concept of blue economy and utilisation of this new engine of economic growth. It delves deeper by looking at its evolution, global best practices, new avenues of growth, emerging technologies, inputs from three state governments, and practical ways forward.

H.E. Mr. Emmanuel Lenain
French Ambassador to India

France is the 2nd maritime power in the world, and the 1st in the European Union. French expertise in blue economy comes from our dynamic shipping industry, our active policies for sustainable fisheries, marine biodiversity and coastal resilience, and our state-of-the-art research centres for marine sciences and technology. France published its National Strategy for the Blue Economy in 2017. Indo-French partnership in this sector is fruitful, and our respective leaders decided to expand it further during their meeting in France in August 2019. I congratulate FICCI in its role as India's national industry association for assuming responsibility to initiate an industry-focused momentum on Blue Economy. We shall support and help this initiative for promoting win-win sustainable partnerships between France and India.

H.E. Mr. Yogesh Punja
High Commissioner of the Republic of Fiji to India

The Pacific Islands' economic relationship with the ocean is once again the center of attention in the world's geopolitical arena. Oceanic economies, both large and small are looking to their seas to bolster their slowing socioeconomic growth through their terrestrial waters by pursuing new opportunities for investment and employment for their nations. This focus can provide competitive advantage in emerging industries such as deep seabed mining and marine biotechnology, food security and for alternative sources of minerals and energy. Seaborne trade and rapid coastal urbanization among others will remain a challenge for all concerned. In line with this, Fiji and other PICs have policies within its various Government Ministries to manage the marine ecosystems in a sustainable manner. For Indian Economy with its focus on the Blue Economy with its holistic agenda around major areas of aquaculture, coastal tourism, marine biotechnology, ocean energy and seabed mining to name a few, is where India has already invested heavily and developing these industries. Capitalizing on expansion and acceleration of such strategic activity in and around the ocean would give India a comparative advantage in expanding its industries for global competitiveness, trade and commerce.

Fiji High Commission – New Delhi, endorsing the spirit of this report compiled by FICCI on Blue Economy and hopes the industries and individuals involved herein will 'harness this resource sustainably' for the betterment of our Oceans and all concerned.

Vinaka.

H.E. Mr. Walter J. Lindner
German Ambassador to India

Germany and India – Partners in Blue Economy

Protecting our environment and mitigating climate change has become one of the most important goals for both Germany and India. Fostering sustainable development, nurturing knowledge and skills is therefore key to ensure our common future on this planet. At the same time, the Blue Economy initiative has the potential to be the driver for ambitious and innovative industrial policies such as energy transition and digitalization in the maritime sector. In this spirit, the Blue Economy: Global Best Practices, Takeaways for India and Partner Nations report to be released by FICCI aims at drawing the attention on the significance of preserving and protecting ocean resources, thereby ensuring sustainable growth on a global scale. Germany supports this ambitious initiative because exchanging best practices is the best way to learn from each other: let's work together to address climate change challenges and to create a livable future for all.

H.E. Mr. Hans Jacob Frydenlund
Norwegian Ambassador to India

India and Norway have long-standing ties in the ocean space. We have established a Joint Task Force on Blue Economy for Sustainable Development to cooperate on issues as Green Shipping, Integrated Ocean Management, Marine Resources and Marine Pollution. The private sector plays a significant role in achieving the Sustainable Development Goal 14. We therefore applaud FICCI's responsiveness to our common challenges through this study on the Blue Economy and we look forward to a continued joint engagement.

1

Executive Summary

Executive Summary

The fast-emerging paradigm of Blue Economy (BE) primarily seeks to harness the ocean resources for sustainable development. The major Blue Economy resources include fish, other living organisms, genetic resources, minerals and other non-living substances, offshore energy and a host of marine services, namely, transport, tourism and communications. Oceans have historically supported humanity for meeting their many essential needs and if harnessed in keeping with their carrying capacity, they would continue to do so forever.

The Blue Economy concept was first articulated by the Small Island Developing States (SIDS) at the Rio+20 Summit on Sustainable Development in 2012. This new approach essentially sought to transform the traditional ocean economy into an ecosystem-driven harnessing of oceanic resources for better conservation of the marine environment. The BE concept is still evolving and different stakeholders have adopted its varying definitions based on their own visions and priorities. However, there exists a broad consensus that with the diminishing land resources, there will be a much greater pressure on the oceans for more resources to feed faster growth to meet the demands of a growing population. Equally, there is also a compelling realisation of the dangers of unsustainable approaches.

The oceans are the foremost climate stabilizers as they directly absorb a lot of heat and recycle an overwhelming share of the greenhouse gases. They also provide significant support to the humanity through food, energy, transport, recreation, and many more intangible benefits. Unfortunately, in the rush for higher and faster growth, we have long ignored their health resulting in dangerous levels of pollution, acidification and warming with extremely serious consequences.

The rising sea levels could submerge valuable land, extreme weather and rising temperature could disrupt water cycle and hurt agriculture, fisheries, rich marine biodiversity and further to aggravate tropical diseases. This could cause unimaginable suffering and economic loss. The good news, though, is that the world community has realised this impending danger and has been working hard to find mitigating solutions. A fast-growing public opinion is clearly demanding the future economic growth and development to be more sustainable. Caring for the oceans' health would always be central to any meaningful solutions.

Some estimates suggest that in many sectors, the ocean-based productivity will exceed the corresponding land-based production both in value and employment generation by 2030. However, these benefits would accrue only if the oceans remain healthy. This realisation over time has culminated in the emergence of a whole new paradigm called the “Blue Economy".

Policy makers, civil society and scientists have been extensively engaged with the evolving Blue Economy dialogue for many years now. Ironically, the business community, which would eventually implement these measures, has not been fully involved. It is in this context that FICCI took a pioneering initiative to set up a Task Force to carry the message and merits of the blue growth directly to the business community for better appreciation of this challenge, and for devising win-win solutions.

Based on extensive consultations with the various stakeholders, the Task Force had prepared a Knowledge Paper titled "Blue Economy – Vision 2025" aimed primarily at the business community in April 2017. Encouraged by wide appreciation of the Knowledge Paper at home and abroad, FICCI decided to set up a six-member Core Group, chaired by Ambassador Rajiv Bhatia, Distinguished Fellow, Gateway House, Mumbai, to carry the process further assess and identify concrete business opportunities in the various sectors of Blue Economy for transforming ideas into action.

Further studies and stakeholder consultations have led the Core Group to come out with this report: Blue Economy: Global Best Practices: Takeaways for India and Partner Nations. The document systematically examines and explains the performance, projected growth in terms of size and value, challenges and precise opportunities for capacity expansion and quality enhancement, including technology and process upgrades, in the relevant sectors of Blue Economy in India. The report also elaborates the global best practices relevant to India as also the innovative financing tools. The Core Group makes several practical recommendations for an effective way forward both for the government and businesses.

The Core Group believes that this report would serve as a good tool for the businesses in India and their partners abroad in adding value to their business operations in a more sustainable eco-friendly manner.

New Delhi
December 2019

1

Introduction

Introduction

In the second decade of the 21st century, Blue Economy has emerged as an exceedingly important, multi-dimensional concept. It has a direct bearing on the contemporary discourse concerning geo-economics and the imperative to increase productivity of oceanic and other water resources, Sustainable Development Goals (SDGs), and the challenge of ensuring maritime security against traditional and non-traditional threats. As the current decade unfolded, greater clarity emerged with regard to the meaning, contours and ends of Blue Economy, driven by the fundamental objective to enhance material welfare of the humankind while safeguarding environment.

Besides, it became apparent that, as a cross-cutting discipline, Blue Economy involves and needs collaboration among scholars, scientists, technology-developers, policy-makers, corporate leaders, entrepreneurs, maritime specialists, naval leaders and diplomats in order to begin realising the optimal potential of the vast opportunities it offered.

As a nation increasingly conscious of its oceanic destiny, dimensions and economic potential, India has been especially interested in shaping and leading the international discourse and policy-making on the Blue Economy. What is even more important is the fact that India Inc too has gradually begun to display greater interest in this crucial issue. In a pioneering move, FICCI, the nation's apex business chamber, published its first Knowledge Paper titled 'Blue Economy: Vision 2025 – Harnessing Business Potential for India Inc and International Partners' in April 2017. This was based on a critical study and assessment of manifold developments till 2016.

Subsequent evolution of thinking and new developments relating to the Blue Economy within and outside India have created the pressing need for another study. This need prompted this Knowledge Report. The report attempts to respond to a question CEOs often ask: “What is the Blue Economy, and how can my company leverage its much-talked about opportunities?”

This study seeks to achieve three key objectives: First, it presents a comprehensive review and evaluation of the Blue Economy initiatives and best practices at the government and corporate levels from various regions of the world. Second, it presents a snapshot of national best practices and successful case studies from different states of coastal India. Third, it analyses the existing gaps in India's Blue Economy model, suggesting how they can be bridged in the pursuit of nation's interests, and where precisely purposeful policy advocacy should be focused in the future.

This publication is the work of collective endeavour of the FICCI Core Group on Blue Economy, carved out of the 16-member FICCI Task Force on Blue Economy., It was proactively assisted by the FICCI Secretariat. The Core Group undertook both primary and secondary research: it studied and debated available literature; interacted with policy-makers and experts at the national, provincial and local levels; held discussions with diplomatic representatives of select but relevant countries; and, benefitted from participation in numerous national and international deliberations on the subject.

The Core Group includes:

1. Ambassador Rajiv Bhatia, Chair; Distinguished Fellow, Gateway House
2. Ambassador Anup Mudgal, Member; former High Commissioner to Mauritius
3. Dr. Vijay Sakhuja, Member; former Director, National Maritime Foundation
4. Mr. H.P. Rajan, Member; former Deputy Director, Division for Ocean Affairs and Law of the Sea, United Nations
5. Prof. V.N. Attri, Member; Chair, Indian Ocean Studies, IORA, University of Mauritius
6. Ms. Sushma Nair, Member; Additional Director and Head, Forum of Parliamentarians and Multilateral Engagement, FICCI

2

Substance of First Knowledge Paper- Blue Economy Vision 2025

Substance of First Knowledge Paper-

Blue Economy Vision 2025

Delving deep into the subject, the FICCI Task Force was struck by two over-arching facets of the Blue Economy.

The first relates to its backdrop. The world population, at present, is 7.6 billion and it is set to rise to 9.8 billion by 2050. While people's needs for goods and services will increase manifold, land-based resources will not be able to meet them. Hence, there is a mix of inevitability and desirability that the resources of oceans, which represent 72% of the surface of the planet, are harnessed judiciously in order to help the humankind sustain itself, while eliminating poverty, creating employment and sustaining inclusive growth.

The second facet relates to the essential nature of the Blue Economy, which is anchored on three pillars of security, sustainability and economic opportunity. The three pillars are interlinked: without a rules-based order of governance and durable maritime security, and without fully nurturing the health of oceans, it is hardly possible for people to benefit from the Blue Economy, which could only be engendered by science and technology. Hence, the Task Force was guided by the basic notion that an integrated and holistic approach was essential.

Above all, the title of the Knowledge Paper – Blue Economy Vision 2025:Harnessing Business Potential for India and International Partners – a seminal publication, the 66-page document, reveals its fundamental perspective.[1]

The "Overview" spells out the meaning and scope of the Blue Economy, stressing on the changing significance of oceans from a classic medium of transport and source of fisheries to becoming a wellspring for multiple resources. Harnessing ocean resources and assets in a sustainable manner has now become central to the world's pursuit of SDGs. SDG 14 which states "Life Below Water – Conserve and sustainably use the oceans, seas and marine resources for sustainable development" directly relates to it. Other SDG goals – 1, 2, 6, 7-13, 15 and 17 are also relevant in this context.

After examining much of the available literature and formulations on the Blue Economy, the Task Force crafted its own formulation, which is as follows:

The Blue Economy encompasses a wide range of economic activities pertaining to sustainable development of resources and assets in the oceans, related rivers, water bodies and coastal regions – in a manner that ensures equity, inclusion, innovation and modern technology. Subtly distinguishable from the "ocean economy" in terms of nuance and emphasis, the Blue Economy is a newer and more contemporary term, popular with Small Island Developing States (SIDS) as well as international organisations, media, experts and governments in a growing number of countries.

[1] *The full text of the Knowledge Paper is available at http://ficci.in/spdocument/20896/Blue-Economy-Vision-2025.pdf*

The paper notes the immense economic value of various activities connected with oceans, ranging from maritime transport to global communications, as food and energy provider, and as a medium for marine tourism. Taking an overall view, it observes that "the oceans are pegged at the seventh position among the world's top ten economies."

The paper also highlights the symbiotic linkage between the Blue Economy and security. Experts often point out that security and prosperity are two faces of the same coin. Although the 1982 United Nations Convention on the Law of the Sea (UNCLOS) has brought order at sea in terms of the management of sea spaces and resources, difficulties are encountered, especially in disputed sea areas and when some states seek to unilaterally exercise authority over them.

The second section outlines the legal regime for exploration and exploitation of marine resources. Inherent in the concept of the Blue Economy is the optimum exploration and exploitation of marine resources within and beyond national jurisdictions. This also involves an inherent obligation to preserve, conserve and protect the marine environment for future generations.

Utilising unique expertise available within the Task Force, a special table was designed that provides a broad overview of the existing legal regime for the exercise of jurisdiction, sovereignty and sovereign rights concerning the exploration and exploitation of resources, and indicates many possible areas of business opportunities.

The third section presents a detailed review of business opportunities and constraints in India. It is meant not only for India Inc and Indian authorities, but has wider relevance in the region. It examines critically the present situation concerning ten major sectors of the Blue Economy. Potential opportunities and challenges in a few of these sectors have been illustrated with relevant charts.

The fourth section outlines the global perspective on the prospects of Blue Economy, as seen from India's viewpoint. A brief reference has been made to Prime Minister Narendra Modi's vision for the Indian Ocean, captured in the acronym SAGAR, standing for "Security and Growth for All in the Region". In another section, mention has been made of the Sagarmala Programme, launched by the Government of India in March 2015, with its three critical components:

(i) Supporting and enabling port-led development through appropriate policy and institutional interventions and providing for an institutional framework to ensure inter-agency collaboration and coordination among ministries/departments/states for integrated development,

(ii) Port infrastructure enhancement, including modernisation and setting up of new ports, and

(iii) Efficient evacuation to and from hinterland.

In the opinion of the Task Force and India Inc in general, the SAGAR vision and the Sagarmala Programme, viewed together, present a comprehensive view of India's long-term policy approach on security and development in the Indian Ocean region. The paper portrays how India's actions have largely matched with her promises, especially in three realms, namely, security measures, development partnerships, and educational and cultural cooperation in the Indian Ocean region. It also identifies a series of promising business opportunities concerning the following countries: Bangladesh, Myanmar, Sri Lanka, Maldives, Mauritius, Seychelles, Malaysia, Thailand, Indonesia, Kenya, Tanzania, Mozambique and South Africa.

Based on the foregoing analysis, the paper, in the fifth section, lists recommendations made by the Task Force with the aim to enhance India's capability to derive maximum benefit from the potential of the Blue

Economy. The macro approach, favoured by it, needs to be based on the tripod of "Growth, Employment and Protection of Environment".

The paper also emphasizes the Task Force's conviction about the desirability of India adopting a holistic strategy which is anchored in Public Private Partnership (PPP). This should be designed to accelerate growth, while ensuring sustainable development. Besides, the nation should demonstrate leadership in developing a normative framework for doing business and harnessing the ocean's potential sustainably. This framework should:

a) Ensure just and equitable environment for seizing the business opportunities in the Indian Ocean region

b) Establish coordination between mature and emerging sectors. Since mature sectors (e.g. shipping, ports, and maritime logistics) have the experience of coping with security challenges, they could provide valuable lessons to the new emerging sectors (e.g. mineral exploitation and offshore renewable energy) to adequately respond to security threats

c) Include elements of national security, human security, marine safety and ecological integrity, both in planning and operations.

Of the main sectors that constitute the Blue Economy, India Inc, the paper highlights the need to accord priority to the following five sectors:

- Fisheries and Aquaculture;
- Seaport and Shipping (including port development);
- Tourism (including island development for tourism);
- Renewable Ocean Energy; and,
- Mining (offshore hydrocarbons and seabed minerals).

Other recommendations and suggestions relate to an array of issues pertaining to resources beyond national jurisdiction, trade and investment, valuable inputs from business and other sectors, the Indian Ocean Rim Association (IORA) and FICCI. Towards advocacy, the Task Force asserts that as the Blue Economy is a new frontier, it is essential to disseminate awareness by embedding this concept into the education and training system, especially in business schools and in economic diplomacy modules by the relevant institutions. The Task Force hopes that the study would trigger a constructive debate within India and among the IORA member-states to assist in developing a comprehensive strategy to leverage the Blue Economy opportunities, both at the national and regional level.

3

Review of Key Developments

Review of Key Developments

3.1 At International Level

It is pertinent to glance at the evolution of international thinking and policy-making on various facets of the Blue Economy in recent years. The important milestones are:

2012

The UN Conference on Sustainable Development (UNCSD), also known as Rio +20 or the Earth Summit, deliberated on developing a global institutional framework for sustainable development and plugging for "Green Economy". While preparing for it, the Small Island Developing States (SIDS) and coastal states argued for the need to take into consideration their specific interests. They insisted on incorporating provisions for better adaptation mechanisms for coastal and sea resource based-countries. This led to a better understanding and sharper focus on "Green Economy in a Blue World" or the Blue Economy itself.

2014

The Global Action Summit for Food Security and Blue Growth, held in the Hague in April 2014, identified numerous steps towards agreed targets for the promotion of fisheries and aquaculture as well as habitat protection and pollution reduction.

2015

The UN Sustainable Development Summit, held in New York, US, in September 2015, adopted the Agenda for Sustainable Development, including the 17 goals known as SDGs (Sustainable Development Goals), to be attained by 2030. As mentioned earlier, one of them, SDG 14 entitled "Life below Water" aims to conserve and sustainably use the oceans, seas and marine resources for sustainable development.

2017

- The UN Conference to Support the Implementation of SDG 14, held in New York in June 2017, increased global awareness about relevant issues. The political declaration titled "Our ocean, our future: call for action" was adopted by the UN General Assembly, which recognized the oceans "as an engine for sustainable economic development and growth".
- Indian Ocean Rim Association (IORA), the grouping of 22 states[2] situated in the Indian Ocean region, held its first-ever Leaders' Summit in Jakarta in March 2017. This resulted in the Jakarta Concord reiterating IORA's commitment to promote the development of the Blue Economy as a key source of inclusive economic growth, job creation and education, centred on evidence-based sustainable management of marine resources.

[2] *The grouping now has 23 states as its members.*

- The IORA Summit was preceded by the First IORA Ministerial Blue Economy Conference (BEC), held in Mauritius in September 2015. The IORA Jakarta Summit was followed by the Second Ministerial Blue Economy Conference, held in Jakarta in May 2017, with an exclusive focus on "Financing the Blue Economy". This produced a substantive statement of principles, elements and guidelines that could shape regional cooperation in the future.[3] With the expected establishment of the Blue Economy Working Group soon, it is envisaged that this subject will stay at the top of IORA's agenda in the coming years.

2018

- BRICS, an important grouping of five states – Brazil, Russia, India, China, and South Africa – has been showing interest and has highlighted "the vast potential in cooperation and collaboration" among its members in "multiple sectors" ranging from maritime transport and marine and coastal tourism to financial and insurance services. In its Johannesburg Declaration of July 2018, BRICS, however, preferred to use the term "Oceans Economy" over the Blue Economy.
- For several years ASEAN and India have been engaged in developing maritime cooperation, including collaboration on maritime education, research, development, and innovation. Besides, they have been holding bilateral dialogues focused on the Blue Economy. The second ASEAN-India Workshop on the Blue Economy[4] was held in Delhi in July 2018. Taking note of its outcome, the leaders at their Breakfast Summit, held in Singapore on November 15, 2018, expressed their support for further exploration of "the potential for ASEAN-India cooperation in this area." [5]
- The Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC), a grouping of five South Asian countries and two Southeast Asian countries, included the Blue Economy in its agenda in 2016.[6] At its fourth summit, held in Kathmandu in August 2018, the BIMSTEC emphasized the importance of cooperation in this domain and agreed to expand it within the framework of sustainable development. It decided to establish an inter-governmental expert group and tasked it to develop an action plan on the Blue Economy, while "keeping in mind the special needs and circumstances of the landlocked member-states".[7]
- The Sustainable Blue Economy Conference, the biggest of its kind, was held in Nairobi in November 2018. Hosted by Kenya, in collaboration with Canada, Japan and others, the conference attracted 18,000 participants from 184 countries. The list included seven Heads of State/Government, 84 ministers and leaders of diverse backgrounds. The three-day conference held wide-ranging deliberations on nine key themes, namely:

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[3] The full text is available at http://www.iora.int/media/8218/jakarta-declaration-on-blue-economy-final.pdf
[4] The first ASEAN-India Workshop on Blue Economy took place in Nha Trang, Vietnam in November 2017. Please see https://www.oceangov.eu/wp-content/uploads/2018/02/Final-Outcome-Document-Workshop-on-Blue-Economy-.pdf
[5] Asean-India Informal Breakfast Summit https://asean.org/storage/2018/11/ASEAN-India-Informal-Breakfast-Summit-Chairmans-Statement.pdf
[6] The outcome document of the BIMSTEC Leaders' Retreat, held in Goa on 16 October 2016, stated: "We recognize the enormous potential that the development of the blue economy holds for our region, and agree to explore ways to deepen our cooperation in areas such as aquaculture (both inland and coastal), hydrography, seabed mineral exploration, coastal shipping, eco-tourism and renewable ocean energy with the objective of promoting holistic and sustainable development of our region." https://www.mea.gov.in/bilateral documents.htm?dtl/27501/BIMSTEC_Leaders_Retreat_2016_Outcome_Document
[7] Fourth BIMSTEC Summit Declaration, Kathmandu, Nepal (August 30-31, 2018); Press Information Bureau Government of India- http://pib.nic.in/newsite/PrintRelease.aspx?relid=183185

- Smart shipping, ports, transportation, and global connectivity,
- Employment, job creation and poverty eradication,
- Cities, tourism, resilient coasts, and infrastructure,
- Sustainable energy, mineral resources, and innovative industries,
- Managing and sustaining marine life, conservation, and sustainable economic activities,
- Ending hunger, securing food supplies, and promoting good health and sustainable fisheries,
- Climate action, agriculture and fisheries, waste management and pollution-free oceans,
- Maritime security, safety, and regulatory enforcement and,
- People, culture, communities, and societies – the inclusive Blue Economy

- The main conclusions of the conference were reflected in the document titled, "The Nairobi Statement of Intent on Advancing the Global Sustainable Blue Economy". First, the global community should intensify investments and harness the full potential of the oceans, seas, lakes, and rivers to accelerate economic growth, create jobs and fight poverty. Second, the world can "simultaneously" work to improve the health of the oceans and their ecosystems that are under increased threats. Third, the development of the Blue Economy requires "the full and effective participation" of all relevant actors in the international community, for attaining SDG 14. Fourth, the public sector has limited capacity to finance required initiatives; therefore, the private sector should "step in to bridge the financing gap". Fifth, the governments should offer "the right incentives" by crafting policy mechanisms to encourage marine activities and support "a pipeline of projects for willing investors". Sixth, science and research are crucial for policy development, implementation, and evaluation. An inter-disciplinary approach to science and technology, law and policy, and human geography and finance should inform policy. Finally, the "survival of humanity, biodiversity and ecosystems", indicated the conference consensus, would "depend on bold, innovative and collective vision and action".
- The full text of the Nairobi Statement lists the elements, principles and building blocks of the Blue Economy; the key messages heard; and the commitments made from around the world.[8] A detailed report on the conference, composed by the International Institute for Sustainable Development (IISD), may also be seen.[9] The final report of the conference is also available.[10]

2019

- Australian Marine Sciences Association organised a conference - AMSA 2019 on the theme "Marine Science for a Blue Economy" from July 7 – 11, 2019 in Fremantle, Perth, Australia. The theme focused on science to protect ocean health and marine life and on the sustainable economic and societal benefits that endorse a growing nation.

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[8] *The Nairobi Statement of Intent on Advancing the Global Sustainable Blue Economy (2018)- http://www.blueeconomyconference.go.ke/wp-content/uploads/2018/11/Nairobi-Statement-of-Intent-Advancing-Global-Sustainable-Blue-Economy.pdf*

[9] *IISD ARFSD Bulletin- A publication of the International Institute for Sustainable Development (April 21, 2019)- http://enb.iisd.org/download/pdf/sd/enbplus208num31e.pdf*

[10] *Report On The Global Sustainable Blue Economy Conference (November 26th - 28th, 2018) Nairobi, Kenya- http://www.blueeconomyconference.go.ke/wp-content/uploads/2018/12/SBEC-FINAL-REPORT-8-DECEMBER-2018-rev-2-1-2-PDF2-3-compressed.pdf*

- Bangladesh had hosted the 3rd IORA Blue Economy Ministerial Conference from September 4-5, 2019 on "Promoting Sustainable Blue Economy - making the best use of opportunities from the Indian Ocean". The third edition was the continuation of the foundation laid by the previous two conferences, which focused on enhancing strategic cooperation on ocean-based growth in the Indian Ocean. The conference had the objective of promoting smart, sustainable and inclusive growth and employment opportunities through economic activities done in the Blue Economy sectors in the Indian Ocean belt. The emphasis was laid on aquaculture, marine tourism, private sector's involvement in infrastructure, port network, financial inclusion, the sustainable exploration and exploitation of various living and non-living resources from the seas and tackling the menace of marine pollution and plastic debris.
- African Conference on Blue Economy to achieve the African Agenda 2063 for Sustainable Development, was organised from September 10-13, 2019 in Egypt by Suez University. The theme of the Conference was "Blue Economy to Achieve the 2063 African Agenda", with focus on key areas including Fish Wealth and Resources, Navigation and Maritime, Energy Extracted from the Marine Environment, Tourism and Marine Archaeology, Natural and Man-made risks, Impacts on Social Composition and Population Demography Along Coastal Areas, and Earth Observation Advanced Technologies and Geo-informatics Systems.
- The Pacific Rim Offshore Wind Summit in collaboration with World Ocean Council, was organised from September 30 to October 2, 2019 in San Francisco. The agenda of the conference was to engage the industry players to help in the evaluation of markets, to work on energy and environmental policy as well as to explore the potential of forming Trans-Pacific partnerships. Furthermore, WOC and Trans-Pacific Offshore Wind Conference are working to foster the Asia-Pacific offshore wind supply chain.
- The 7th Sustainable Ocean Summit (SOS) was held in Paris from November 20-22, 2019. The aim of this summit, with a theme of "Investing in Ocean Futures: Finance and Innovation for the Blue Economy", was to engage the private sector on ocean sustainable development and to encourage investment and innovation for sustainable development. FICCI presented the India prospective at this summit and signed an MOU (Memorandum of Understanding) with a World Ocean Council (WOC) for advancing India's Blue Economy.
- Overall, a key point needs to be made here: of all the international platforms concerned with the Blue Economy, IORA is perhaps the most advanced and dynamic in pushing for specific forms of cooperation in this domain. India, as its leading member and with a pivotal position in the region, would do well by putting its policy creativity, institutional energy and financial resources in supporting IORA's programme of action on the Blue Economy and developing partnerships with multilateral and regional institutions and groupings.

3.2 In India

Finance Minister Sitharaman presented a vision for the forthcoming decade. Out of the ten issues addressed by her in the Union Budget for the FY 2019- 2020, she specifically pointed out that Blue Economy is a key concern for India's economic development. She talked about the Sagarmala Programme which is directed towards the enhancement of port connectivity, modernisation and port-linked industrialisation. She also remarked that waterways is a cheap mode of transport and internal trade through inland water transport is beneficial."

Smt. Nirmala Sitharaman, Hon'ble Finance Minister
(Union Budget Speech 2019-2020, July 5, 2019)

It is heartening to note that in recent years India has been showing considerable interest in strengthening all the three pillars of the Blue Economy, namely, security, sustainability and economic opportunity. The government launched the Sagarmala Programme in March 2015.[11] Prime Minister Narendra Modi announced a new doctrine named 'SAGAR' (Security and Growth for All in the Region) during his visit to Mauritius, also in March 2015.[12] Weaving different threads into a holistic pattern, he delivered the inaugural address at the Maritime India Summit on April 14, 2016.[13]

The National Perspective Plan of the Sagarmala Programme was released at this conference. The Prime Minister spoke of India's glorious maritime history and heritage as well as its determination to shape "an even better maritime future". The plan to make new investments in port development and infrastructure, accord priority to capacity building and training, deploy modern and sophisticated fishing vessels, and focus on value addition in fisheries, aquaculture and cold chain development, was emphasized. The Prime Minister stated categorically "Investing in maritime sector is not only investing in one's own future, but in the future of the planet and that of coming generations."

At the government level, a number of ministries and agencies are responsible for carrying forward a variety of initiatives and projects pertaining to the development of the Blue Economy in collaboration with state governments.

With regard to the international dimensions of discourse and diplomacy relating to the Blue Economy, the Ministry of External Affairs (MEA) plays a proactive role, ensuring that India's participation in global policy-making serves its national interests. In this context, two recent developments deserve a brief mention here.

First, a senior official of MEA explained, in July 2018, the Government's thinking in an address exclusively devoted to the Blue Economy. Defining it as harnessing marine resources for economic and social development in a sustainable manner, she stated: "Blue Economy is the path on which alternate economic models for sustainable development are based, while keeping oceans as the central focal point." She identified the following as the "priority sectors" for India's maritime ecosystem: shipping, ports, Container Freight Stations (CFS)/Inland Container Depots (ICD) and Coastal Economic Zones (CEZ), road, rail and coastal connectivity, shipbuilding, investments, advisory, technology, training and leisure including cruise and lighthouse tourism. She added that ASEAN-India cooperation in this field had "tremendous scope".[14]

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[11] For a critique of the Sagarmala Programme, please peruse "Occupation of the Coast - Blue Economy in India" p.42 at https://in.boell.org/sites/default/files/occupation_of_the_coast_-_the_blue_economy_in_india.pdf
[12] Text of the PM's Remarks on the Commissioning of Coast Ship Barracuda (March 12, 2015)- https://www.narendramodi.in/text-of-the-pms-remarks-on-the-commissioning-of-coast-ship-barracuda-2954
[13] PM's Inaugural Address at the Maritime India Summit, 2016- Press Information Bureau, Government of India- https://pib.gov.in/newsite/PrintRelease.aspx?relid=138867
[14] 2nd ASEAN-India Blue Economy Workshop Keynote Address by Secretary (East)- MEA (July 18, 2018)- https://www.mea.gov.in/Speeches-Statements.htmldtl/30097/2nd_ASEANIndia_Blue_Economy_Workshop_Keynote_Address_by_Secretary_Eas

Second, Indian authorities have been exerting themselves suitably in order to help the IORA refine its Blue Economy strategy, particularly its endeavours to establish its Working Group on Blue Economy.

Besides, it may also be noted that the Government launched the Information Fusion Centre – Indian Ocean Region (IFC-IOR) at the Information Management Centre (IMAC), Gurugram, in December 2018. The fusion center aims to engage with partner nations and international agencies to develop comprehensive maritime domain awareness and share information on vessels of interest. The implementation of this collaborative endeavour will help secure the global commons for a peaceful, stable and prosperous region.

NITI Aayog (National Institution for Transforming India), the government's policy think tank which replaced the Planning Commission in January 2015, initiated a consultative process in mid-2018. It tasked a select set of officials and outside experts to produce policy documents on India's long-term maritime strategy and approach on the Blue Economy. Their reports are awaited.

Of all the national industry chambers, FICCI has been the most active and productive in exploring, investigating and pursuing opportunities in economic sectors relating to the oceans. This exercise has been managed strictly from the perspective of the nation's business sector within the overall context of national interests. Some of the important measures taken by FICCI are:

- Publication and launch of the "Blue Economy – Vision 2025" in April 2017.
- Its formal presentation by the Chairman, FICCI Task Force at the IORA Ministerial Meeting in Jakarta on May 9, 2017. The Knowledge Paper received considerable attention and appreciation, with the ranking Indian Government representative observing: "This report is not just India-specific, but (is) significant for all member-states." The host government, Indonesia, noted with deep appreciation the high quality of the publication, which was distributed free of charge.
- FICCI's active and fruitful participation in the business section of the above meeting.
- The formal presentation of the first study by a member of the FICCI Task Force at the India-Pacific Islands Sustainable Development Conference, held in Suva, Fiji in May 2017. The study was warmly welcomed by participants including the representatives of 14 Pacific Island countries.
- FICCI's participation in the Sustainable Blue Economy Conference held in Nairobi in November 2018.
- Its regular liaison with the Secretary General of IORA in accordance with FICCI's role as the designated Business Secretariat of the regional grouping.
- Periodic consultations with the Ministry of Shipping, MEA and other ministries; select foreign embassies; and, other stakeholders, including governments and business organisations of the coastal states in order to promote the idea of all-round collaboration and identify specific opportunities and challenges. These were held between November 2018 and June 2019.
- Holding of a major national conference on the Blue Economy in Mumbai in February 2019, as a collaboration between Maharashtra Economic Development Council (MEDC) and FICCI. Its central outcome was to evolve a national perspective to develop India as a regional hub of the Blue Economy business opportunities in Asia-Pacific and IOR. It focused on creating Centre-State partnerships to promote seamless development and leverage opportunities in the Blue Economy.
- The Blue Economy has begun to draw the attention of a few think tanks and academic institutions in India. Research and Information System for Developing Countries (RIS), Gateway House, National Maritime Foundation (NMF), Observer Research Foundation (ORF), The Energy and Resources Institute (TERI) and Vivekananda International Foundation (VIF), are focusing their energies on researching and writing about it. Experts seem to show interest in the strategic and security aspects as well as the developmental, ecological and business facets of the Blue Economy. Mainstreaming of the Blue Economy as an integrated system needs to be a priority.

4

A Critical Survey of Best Practices

A Critical Survey of Best Practices

This section presents an analysis of the strategies, policies and practices on the Blue Economy adopted by global institutions, regional groupings and a few select nations. These have relevance for India and other countries in multiple ways.

4.1 The World Bank

The World Bank Group (WBG) has a treaty-based partnership with the United Nations for supporting the global developmental agenda. This relationship has further deepened with the adoption of first Millennium Development Goals (MDGs), followed by the Sustainable Development Goals (SDGs) or the Agenda 2030. The global financing for sustainable development received further impetus from the Addis Ababa Action Agenda and COP-21 (Conference of Parties). The SDGs also fit well with the WBG's primary goals of ending extreme poverty and boosting shared prosperity. The WBG works with three thematic tools for facilitating sustainability: finance, data and implementation.

As part of its environment strategy for 2012-22, the WBG has embedded its development agenda in three basic goals of green, clean and resilient world. "Green" promotes sustainable harnessing of global natural resources, including the oceans. "Clean" aims to address all causes of pollution and contamination. "Resilience" helps the global societies to be better prepared for adverse impacts of climate change. The WBG seeks to mainstream these goals in the development financing mechanisms at all stages of degradation – avoidance, mitigation and redressal.

Provision of clean drinking water and sanitation has long been important issue for financing, with an extensive portfolio of $37 billion in water-related projects and over $4 billion for various Blue Economy sectors. The World Bank has been supporting a range of projects for waste water treatment, pollution mitigation, sustainable fisheries, coastal management, port improvement and renewable energy.

The World Bank raised over $660 million through the innovative launch of sustainable bonds in August 2018. This demonstrates the importance being attached by the donors in both public and private sectors to support the sustainable goals. In the ten-year period since 2008, the WBG has raised a total of $12.6 billion.

The World Bank was the founding member of the famous multi-donor International Coral Reef Initiative for protection and revival of the coral ecosystems in many countries. Since the early nineties, there has been an investment of over $235 million on coral protection and related projects under this initiative, resulting in diverse benefits of biodiversity restoration. This has also helped local communities by way of better reef fishing and eco-tourism.

In a major initiative, the World Bank also launched a global programme named PROFISH for promoting sustainable fishing to primarily assist fishing communities in the developing countries. The assistance is provided through improved governance and technical, financial and market support. PROFISH investments of $4.5 million in research, analysis and technical support have generated $1 billion in WB lending to the sector, including private sector investments for sustainable supply chains.

Another innovative landmark for financing the Blue Economy was the setting up of PROBLUE in September 2018, a multi-donor trust fund for healthy and productive oceans by addressing marine pollution and managing fisheries for fostering sustainable growth of coastal economies. This initiative is part of an overall programme that follows a multi-pronged approach to ensure protection and sustainable use of all marine resources. The key themes of the PROBLUE programme are:

i) management of fisheries and aquaculture;

ii) marine pollution, including plastic;

iii) sustainable development of coastal tourism;

iv) maritime transport, offshore renewable energy and governance issues.

The WB has a long-standing relationship with India, with the first funding coming in 1949 for the Indian Railways. As per the latest reports, the WBG has a total of 106 operations in India with a cumulative commitment of $26.7 billion in literally all segments of SDGs, including the Blue Economy related sectors of water and sanitation ($5.2 billion) and energy/renewable energy ($2.6 billion). The WB has also supported a series of inland waterways projects, river cleaning initiatives as well as integrated coastal zone management projects.

The International Finance Corporation (IFC) has also been financing several sustainable development projects in India, especially for renewable energy. Their own commitment, as of now, is over $6 billion, with an additional amount of $9 billion raised from the market/other lenders. For supporting the sustainable development projects in India, the IFC issued the first ever Rupee-denominated Green Bonds on the London Stock Exchange to raise $45.6 million to fund climate mitigation projects for the private sector. These bonds have been issued under the IFC's 'masala bond' programme. This has led to the similar green bonds being issued by SBI, Axis Bank, CLP, India, Yes Bank and Hero Future Energies. These initiatives can open a completely new channel for financing green/blue growth.

Organisation for Economic Co-operation and Development (OECD)

OECD policies promote the economic and social well-being of people around the world. Further, OECD believes that ocean economy has huge potential for growth and job creation which can be realized through innovation and new thinking in science, technology, R&D, manufacturing, infrastructural design, consultation and decision-making processes, and institutional co-operation.[15]

The Directorate for Science, Technology and Innovation of the OECD has a programme which offers "decision-makers with an improved toolbox to foster innovation for harnessing the ocean economy's potential in a responsible and sustainable way,"[16] through scientific advances and enabling technologies for innovation in the ocean economy. Also, collaboration in innovation among different marine and maritime actors in ocean R&D around the world and the use of economic valuation, analysis and tools will impact the policy mix in boosting innovation in the ocean economy.

[15] *For details, see "OECD Report Ocean Economy 2030 "- https://www.oecd.org/environment/the-ocean-economy-in-2030-9789264251724-en.htm*

[16] *The Ocean Economy in 2030", OECD (2016); OECD Publishing, Paris- http://www.oecd.org/futures/oceaneconomy.html*

United States

The US prefers to use the terms "coastal economy" and "ocean economy". The coastal economy is primarily an urban economy. Thirty coastal states with a population of 256 million (82% of the US) employ over 107 million people and contribute nearly $13 trillion (83% of the US) GDP.[17] The ocean economy (2010) comprised over 2.7 million jobs and contributed over $258 billion (2.7%) to the GDP of the United States. The tourism and recreation sector was the largest sector by both employment and GDP.

The US has set up the National Ocean Economics Program (NOEP), which measures key economic indicators of the coastal and the ocean economy as well as the Ocean Economy Accounting System (OEAS). However, according to the US National Oceanic and Atmospheric Administration (NOAA), ocean economy includes marine transportation, tourism, ocean exploration, and fisheries, and amounts to nearly $320 billion.[18] In 2018, President Donald Trump proclaimed the month of June as the National Ocean Month. In his address he underscored the potential of the Exclusive Economic Zone (EEZ) and called on the industry to develop and deploy new technologies to explore, map and make inventory of resources through advanced observational technologies, and augment economic competitiveness, enhance national security, and ensure American prosperity.[19]

The US also supports the growth of ocean economy through capacity building of developing nations. During the 2018 "Our Ocean Conference" in Bali, Indonesia, the US announced 15 commitments to "strengthen sustainable management of marine resources; prevent plastic and other debris from entering the ocean; support research and observation of ocean ecosystems; and foster partnerships promoting maritime security and a sustainable Blue Economy."[20] In Kenya, during the "Sustainable Blue Economy Conference" in November 2018, the US offered partnership with Kenya in establishing the Kenya Coast Guard Services.[21]

European Union

The European Union (EU) has labeled "Blue Growth" as its long-term strategy for sustainable development of marine and maritime sectors. The strategy exhibits a strong belief that the seas and the oceans have enormous potential for economic growth, innovation and job creation. Furthermore, the strategy is critical for achieving the goals of smart, sustainable and inclusive growth, the three keywords that define Europe 2020 strategy. "Blue Growth" identifies five sectors – aquaculture, coastal tourism, marine biotechnology, ocean energy and seabed mining – that have a high potential for sustainable growth and job creation. These can be harnessed through marine knowledge, marine spatial planning and integrated maritime

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[17] *"Blue Economy: Expanding India-US Maritime Cooperation"; Author: Dr Vijay Sakhuja (September 14, 2016)- http://www.maritimeindia.org/View%20Profile/636094238574342172.pdf*

[18] *"Senate Commerce Subcommittee considers NOAA Blue Economy Initiative" (July 24, 2018)- https://www.americangeosciences.org/policy/news-brief/senate-commerce-subcommittee-considers-noaa-blue-economy-initiative*

[19] *"President Donald J. Trump Proclaims June 2018 as National Ocean Month" (May 31, 2018)- https://www.whitehouse.gov/presidential-actions/president-donald-j-trump-proclaims-june-2018-national-ocean-month/*

[20] *See https://www.state.gov/e/oes/rls/other/2018/286990.html*

[21] *Summary of the commitments made during the sustainable blue economy conference, Nairobi, Kenya (November 26th - 28th, 2018)- http://www.blueeconomyconference.go.ke/wp-content/uploads/2018/12/FINAL-SBEC-COMMITMENTS-14-Decemebr-2018-4pm.pdf*

surveillance. Given the large sea basins of each of the EU coastal states, the strategy ensures tailor-made approaches to foster cooperation among countries.

The EU's Blue Economy is estimated to have an annual output of about Euro 500 billion and accounts for nearly 5.4 million jobs. The European Commission (EC) pays money to buy marine and maritime goods and services from private contractors through competitive bidding by calling for tenders which are announced on its website.[22] The EC also has provision, on its selection criteria, for funding grants based projects to support maritime affairs and fisheries. The European Maritime Fisheries Fund (EMFF) supports the fishing industry and coastal communities to be "economically resilient and ecologically sustainable".[23]

Under the Marine Knowledge 2020, the EU collects marine and scientific data from member-states and other different sources to help the industry, government agencies and research and development institutions in order to develop new products and services.[24] The Blue Career Project of the EU facilitates collaboration between business and education to develop and implement concrete actions to close the skills gap, tackle the unemployment challenge and raise the attractiveness of 'blue careers' among students. In 2016, A New Skill Agenda for Europe was launched to ensure the development of necessary skills among people to support the growth across the EU.[25]

The European industry is a world leader in maritime technology and innovation. Over the last decade, marine and maritime sectors have diversified into building complex vessels and platforms, and advanced technologies to support a number of verticals such as offshore wind, ocean energy, marine biotechnology, aquaculture, deep sea exploration and surveillance. "Blue Growth" is research intensive. The EU has invested in research, development and innovation (RDI) and is continuously innovating and diversifying into new activities.[26]

Norway

Norway is endowed with enormous technological capabilities and business experiences to support growth of the Blue Economy. Its investments in ocean research, education, and strengthened collaboration across industries is noteworthy.

The maritime domain is witnessing phenomenal changes led by Artificial Intelligence. One of the most notable developments is the arrival of autonomous vessels in the shipping industry.

Among many successful examples of Norwegian interest in the Blue Economy, Kongsberg Maritime, a Norwegian technology enterprise, is building "Yara Birkeland",[27] an autonomous electric-powered vessel capable of carrying 100 to 150 shipping containers. This will be completed by 2020. Another Norwegian

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[22] *Tender opportunities - maritime affairs and fisheries, European Commission- https://ec.europa.eu/info/funding-tenders/tenders/tender-opportunities-department/tender-opportunities-maritime-affairs-and-fisheries_en*

[23] *Maritime Affairs- Funding Opportunities; European Commission- https://ec.europa.eu/maritimeaffairs/financial_assistance_en#info*

[24] *Marine knowledge 2020, European Commission; For details, see https://ec.europa.eu/maritimeaffairs/policy/marine_knowledge_2020_en*

[25] *Skills and career development in the blue economy; Integrated maritime policy; European Commission; For more details, see https://ec.europa.eu/maritimeaffairs/policy/skills-career-development_en*

[26] *Ibid; See https://ec.europa.eu/maritimeaffairs/policy/skills-career-development_en*

[27] *"Yara and kongsberg enter into partnership to build world's first autonomous and zero emissions ship" (May 9, 2017)- Kongsberg Maritime- https://www.km.kongsberg.com/ks/web/nokbg0240.nsf/AllWeb/4B8113B707A50A4FC125811D00407045?OpenDocument*

company called "Massterly", a joint venture between the shipping group Wilhelmsen and technology firm Kongsberg, has announced plans to launch a "complete value chain for autonomous ships, from design and development, to control systems, logistics services and vessel operations".[28] This project will also involve setting up infrastructure and services to manage and operate these vessels in an autonomous mode.

Finland

The Finnish inland waters, coasts and archipelago are abundant in fish resources.[29] The country has advanced technologies that enable it to engage in innovative business activities.[30] In Finland over 60% of the country's total population lives in coastal regions. The gross value added (GVA) of coastal regions in Finland was 67% of the national GVA in 2010, and the Gross Domestic Product (GDP) per capita in Finland's coastal regions was 11% higher than the national average GDP per capita.[31]

Finland has "Maritime Transport Strategy" and the vision for 2030 is "A prosperous Finland – efficient sea routes". Under this strategy, Finnish maritime transport sector will service the Baltic Sea region countries. Besides, shipbuilding is growing and new production techniques using 3D printing are an opportunity to expand the logistics business by combining transport and production.[32]

Canada

Canada enjoys unique geographical advantages and is endowed with the world's longest coastline. It is surrounded by three oceans, that is, Arctic, Atlantic and Pacific, which provide it with enormous opportunities to harness the wealth of the oceans. Its ocean economy accounts for only 1% of the national economy and, the Canadian government aims to adopt numerous forward-looking ocean policies to engage the industry and enhance output from the oceans through sustainable development of resources.

The Ocean Supercluster is an industry-led collaboration for ocean-based companies in the Atlantic to transform the nation's ocean economy into a technology-driven, digitally powered knowledge economy. The supercluster is an enabler for ocean economy to grow from $20 billion to over $30 billion by 2050.[33] Its focus is on marine renewable energy, offshore aquaculture, ocean frontier oil and gas, and marine bio-resources. Furthermore, it will also be part of Canada's road map for innovation and "smart oceans" through digitalization. The established sectors such as fishery, shipping, ship-building, maritime defence, and offshore oil and gas will also be digitally-driven to, sustainable sources of new economic and social value.

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[28] *"World's First Autonomous Shipping Company Established in Norway" (April 4, 2018); Mike Schuler; gCaptain- https://gcaptain.com/worlds-first-autonomous-shipping-company-coming-to-norway/*

[29] *Finlands Fisheries Industry (2018)- Publication Partially Funded By The Emff- http://sakl.fi/wp-content/uploads/2012/02/Finlands_fisheries_industry_-2018.pdf*

[30] *Research and expertise to boost the blue bioeconomy; Ministry of Agriculture and Forestry (October 13, 2017) - https://valtioneuvosto.fi/en/artikkeli/-/asset_publisher/1410837/tutkimuksesta-ja-osaamisesta-vauhtia-siniselle-biotaloudelle*

[31] *National OCEAN Strategy 2013 - 2020; Governo De Portugal- https://www.msp-platform.eu/sites/default/files/nos_2013-2020.pdf*

[32] *Maritime Transport Strategy for Finland 2014-2022- https://www.zerovisiontool.com/sites/www.zerovisiontool.com/files/attachments/finnish_transportstrategy2014mini.pdf (accessed 11 April 2019).*

[33] *Canada's Ocean Supercluster Strategy- https://oceansupercluster.ca/images/OSC_Supercluster_Strategy.pdf*

Portugal

Portugal's sea-based economy is worth nearly €5 billion, totaling to €4.2 billion in gross added value (GAV) which corresponds to 2.6% of GAV for the Portuguese economy and brings in around €4.8 billion in GDP.[34] In 2015, the country established a Ministry of Sea to oversee the development of the Blue Economy, to formulate ocean policies based on scientific discoveries and technological innovations. The focus areas are fisheries, aquaculture, tourism, energy, and biotechnology. The major components of the sea-based economy are fishing, sea tourism and the ports industry and maritime services.

The coastal tourism has grown significantly and contributes nearly 75% of all jobs in the Blue Economy and 78% of all profits. In 2016, this sector employed 178,000 people and this figure continues to grow.[35] Under this sector, marine sporting activities are significant and the country boasts of popular destinations such as a Peniche which has been rated as the "Capital City of the Wave", Ericeira, as the "World Surfing Reserve", and Nazaré as the "Wave of Nazaré".[36] The Azores has been acknowledged as a new world destination, and actively contributes towards strengthening this identity, in particular among the younger generation. Portugal also finds reference in other sports such as sailing and canoeing.

In Portugal, ocean economy represents around 3.1% of Gross Value Added and 3.6% of employment of the whole Portuguese economy which employs about 60,000 entities. The aim is to increase by 50% the contribution of the Blue Economy within the national economy by 2020. The thrust areas are: (a) promotion of a global network of Port Tech Clusters and Green Shipping; (b) promotion of ocean renewable energies and blue biotechnology; (c) 'Bluetech' Accelerator involving innovation through Fourth Industrial Revolution (4IR) technologies; and, (d) Blue Fund, financed through the national budget.

There are investment opportunities in Portugal's ocean economy in five sectors, that is, fisheries and aquaculture; Blue biotechnology; ports & shipping; ocean renewable energies; LNG hub for vessels and virtual pipelines. Further, ocean and sea investments require blending of financial instruments and under PT2020, The European Structural and Investment Funds (ERDF), Cohesion Fund, ESF, EAFRD and FEAMP set out the programming principles enshrining economic, social and territorial development policy to 2014 and 2020.

Germany

In Germany, the Federal Ministry for Economic Affairs and Energy is the nodal agency for marine technology and a "holistic, sustainable development of all maritime related policy" has been on its agenda since 2011.[37] The annual turnover of the maritime industry is €50 billion and nearly 400,000 jobs are directly or indirectly dependent on the maritime industry. The maritime sector is spread across the country and maritime-related production takes place across Germany, particularly in Baden-Wuerttemberg, Bavaria and North Rhine-Westphalia.

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[34] *Economy of the sea in Portugal worth nearly €5 billion (Sep 05, 2018)- https://www.devere-portugal.pt/news/Economy-of-the-sea Portugal-worth-nearly-5-billion*

[35] *Ibid.*

[36] *NATIONAL OCEAN STRATEGY 2013-2020- https://webcache.googleusercontent.com/search?q=cache:7fDylliENVgJ:https://issuu.com/dgpm_portugal/docs/nos2013_2020+&cd=1&hl=en&ct=clnk&gl=in*

[37] *The Maritime Industry; Federal Ministry for Economic Affairs and Energy, Germany- https://www.bmwi.de/Redaktion/EN/Dossier/maritime-industry.html*

The government announced the "Maritime Agenda 2025", a long-term strategy for the marine sector including offshore renewable energy which identifies nine "fields of action" within the national industrial policy. These include technologies for future markets, a road map for research and innovation, the energy transition within the maritime industry, and Industry 4.0 within the maritime value chain. Maritime policy is a branch of industrial policy. Interestingly, the German maritime industry is primarily under the private sector. Some of the important features for competition are efficient ports and logistics as well as high-end research and training facilities. Also, digitalised production, logistics and governance processes would result in the sector turning more efficient and sustainable to withstand the growing pressure of international competition in future.

In Germany, regulations for Marine Spatial Planning of the territorial waters and the Exclusive Economic Zones are covered under various regulations. Spatial Plans for the EEZ are conducted by the Federal Maritime and Hydrographic Agency (BSH), with the approval of the Ministry of the Interior, Building and Community (BMI). Further, the Coastal Federal State is responsible for the drawing up/setting up of the Spatial Plans for the German territorial waters. The BSH presently uses Spatial Plans of 2009 for the German EEZ and the revision is expected to start by mid-2019 and would be completed by 2021. The revised document would undergo a consultation process involving all relevant authorities and actors and the final plans would then be placed before the Cabinet and the German Federal Parliament.

Currently, two major Research, Development and Innovation funding schemes on the sustainable use of marine and coastal ecosystems have been initiated by the German Federal Ministry of Education and Research (BMBF) which focus on the sustainable use of marine biological resources for bio-economic development. The overarching objective of funding is to look into new biological and biotechnological processes and apply the knowledge that has been gained.

France

France has large Exclusive Economic Zones and these spaces correspond to twenty times the country's area. They contribute an equivalent of 14% of the country's GDP,[38] and almost 300,000 direct jobs are linked to the oceans, with a production value of about €69 billion.[39] The National Strategy for the Sea and Coastline promotes the development of the maritime economy.[40] Its general guidelines identify 26 priority actions under four sectors: (a) create knowledge and promote innovation (b) develop sustainable and resilient maritime and coastal territories; (c) support and enhance initiatives and remove barriers; and, (d) promote a French vision within the European Union and in international negotiations.

France has the fourth largest Blue Economy in Europe and represents nearly 10% of that of EU. Among the sub-sectors, the French fishing sector accounts for Euro 1.7 billion of revenue.[41] France is Europe's market leader in aquaculture with 30% of the EU's value added.[42]

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[38] *See The Blue Economy Sustainable Blue Growth: A National Opportunity? https://www.wavestone.com/app/uploads/2018/03/blue-economy.pdf p.2.*
[39] *Ibid.*
[40] *National Strategy for the Sea and Coast Decree 2017-222 (February 23, 2017); Ministry for an Ecological and Solidary Transition- http://www.geolittoral.developpement-durable.gouv.fr/IMG/pdf/17094_strategie-nationale-pour-la-mer-et-le-littoral_en_fev2017.pdf*
[41] *Ibid.*
[42] *See Speech by Commissioner Karmenu Vella: "The Blue Economy: European support of French Excellence", Assises de l'économie de la mer, 27 November 2018, Brest, France. https://ec.europa.eu/commission/commissioners/2014-2019/vella/announcements/speech-commissioner-karmenu-vella-blue-economy-european-support-french-excellence-assises-de_en*

Further, it is a world leader in the export of support services for offshore extraction, and the construction of sailboats and rigid hull inflatable boats.[43]

4.2 China

China's coastal regions contribute significantly to the national economy and account for 20% of China's land area, hold 40% of the population and account for 60% of China's GDP.[44] The policy on development of the ocean economy identifies several initiatives to harness the seas. The Five-Year Development Plan for National Marine Economy monitors progress of various marine sectors. Under the 13th Five-Year Plan (2016-2020), the National Development and Reform Commission (NDRC) and the State Oceanic Administration (SOA) have set goals to pursue scientific and technological innovation in marine biological medicine, seawater desalination, modern marine services and other newly-emerging industries, while paying special attention to protecting the marine ecology and environment.

According to SOA, in the past five years, China's annual gross production value of the national maritime industry grew by 7.5% and accounted for nearly 10% of the country's GDP.[45] The maritime economy generated ¥7.8 trillion ($1.22 trillion) in 2017. China is expected to increase the gross production value of its maritime industry to ¥trillion by 2020. The target now is to increase it to nearly 15% of the country's GDP by 2035.[46] Between 2016 and 2020, China is expected to build 10 to 20 marine economy demonstration zones to further optimize the maritime economy, build a blue eco-security shield while innovating comprehensive marine administration systems.[47]

China has a sophisticated accounting system for the Blue Economy and has standardised the data, which is collected across the whole country and collated by the SOA. The Ocean Economy Accounting System (OEAS) was established in 2006 to provide marine policymakers statistics on China's engagement with marine activity.[48] The SOA published Industrial Classification for Ocean Industries and Their Related Activities which establishes statistical standards for the ocean economy and assigns unique codes to each industry.[49]

Under the Blue Economy accounting system, major ocean sectors and industries are based on statistical classification of CCSNEI (Classification and Code Standard of National Economy Industry), which is quite similar to the NAICS (North American Industrial Classification System).[50] For administrative and statistical purposes, the entire shore line is divided into three categories, that is, provincial administration areas; city administration areas; and, county administration areas.

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[43] *See The Blue Economy Sustainable Blue Growth: A National Opportunity? https://www.wavestone.com/app/uploads/2018/03/blue-economy.pdf p.2.*
[44] *Xiaohui Wang, "The Ocean Economic Statistical System of China and Understanding of the Blue Economy", Journal of Ocean and Coastal Economics, Vol. 2, Iss. 2 [2016], Art. 10*
[45] *"China Focus: China's maritime economy expands by 7.5 pct in recent five years", Xinhua, 21 January 2018.*
[46] *Ibid.*
[47] *"Maritime economic development plan issued"; Li Yang; Belt and Road (2017) https://eng.yidaiyilu.gov.cn/zchj/zcjd/18392.htm*
[48] *Rui Zhao, Stephen Hynes and Guang Shun He,"Blue Growth in the Middle Kingdom: An analysis of China's Ocean Economy", Working Paper 13-WP-SEMRU-05, The Socio-Economic Marine Research Unit (SEMRU), National University of Ireland, Galway.*
[49] *The major ocean industries classified are (a) marine fishery; (b) offshore oil and gas; (c) ocean mining; (d) marine salt; (e) shipbuilding; (f) marine chemical industry; (f) marine biomedicine; (g) marine engineering; (h) marine electric power; (i) seawater utilization industry; (j) marine communications and transportation(k) and coastal tourism*
[50] *Xiaohui Wang, "The Ocean Economic Statistical System of China and Understanding of the Blue Economy", Journal of Ocean and Coastal Economics, Vol. 2, Iss. 2 [2016], Art. 10*

Another important feature of China's Blue Economy system is the collection, compilation and management of socio-economic data for the various marine-related sectors, which supports national approach and promotion of sustainable marine policy.[51]

There are several opportunities for businesses, entrepreneurs and startups to participate in marine and maritime-related trade shows and expos such as marine and boat trade shows; shipbuilding and marine technology; and, intermodal Asia in Shanghai.[52]

4.3 Other Regions Implementing Blue Economy

This section presents a summary of the initiatives undertaken in other regions in implementing the Blue Economy and highlights their best practices.

Indian Ocean Rim Association (IORA)

IORA adopted the Blue Economy as a major goal at the Council of Ministers meeting held in Perth in October 2014. It identified eight priority areas of cooperation: Fisheries and Aquaculture; Renewable Ocean Energy; Sea, Ports and Shipping; Seabed Exploration and Minerals; Marine Biotechnology; Research and Development; Tourism; Ocean Knowledge Clusters and SIDS and LDCs.

Since 2014, several capacity building programmes have been carried out covering a wide range of areas, including inter alia: fisheries and aquaculture; seafood products safety and quality; seafood handling, post-harvest processing and storage of fisheries and aquaculture products; banking and artisanal fisheries; sustainable management and development of fisheries resources; fish trade; seaport and shipping; maritime connectivity; port management and operations; Marine Spatial Planning; ocean forecasting/ observatory; blue carbon; and, renewable energy.

The First IORA Ministerial Blue Economy Conference (BEC) was held in Mauritius on September 2-3, 2015 in which the Blue Economy Declaration was adopted. Reflecting on the global trends, this declaration underlines the need to harness oceans and maritime resources to drive economic growth, job creation and innovation, while safeguarding sustainability and environmental protection.

Indonesia hosted the Second Ministerial Blue Economy Conference on "Financing the Blue Economy" in May 2017. This resulted in the Jakarta Declaration which suggested optimising the use of existing financial instruments in the IORA region to promote the development of the Blue Economy in the Member-States. The need for new and innovative financing mechanisms and strengthening collaboration between the public and private sectors as well as with the dialogue partners was highlighted.

It is envisaged that the Blue Economy development will be further strengthened in the coming years with the establishment of the Blue Economy Working Group. The preparatory meeting for its establishment was held from in September 2018 in Port Elizabeth, South Africa. This emanated from the IORA Action Plan 2017-2021, adopted at the Jakarta Summit. The Summit also saw the adoption of the Jakarta Concord that

[51] *Rui Zhao, Stephen Hynes and Guang Shun He,"Blue Growth in the Middle Kingdom: An analysis of China's Ocean Economy", Working Paper 13-WP-SEMRU-05, The Socio-Economic Marine Research Unit (SEMRU), National University of Ireland, Galway.*
[52] *For more details on marine related trade shows, visit Trade Fair Dates- https://www.tradefairdates.com/Fairs-China-Z47-S2.html*

reiterated IORA's commitment to promote the development of Blue Economy in the region as a key source of inclusive economic growth, job creation and education, based on the evidence-based sustainable management of marine resources.

The third Ministerial conference on the Blue Economy was held in Dhaka, Bangladesh in September 2019.

Several IORA countries have been taking steps to reduce the degradation of the marine resources, plastic pollution, unsustainable fishing, extraction of non-renewable marine resources, and rising water salinity from desalination. For example, India uses marine plastic waste as raw material for road building. Indonesia has set up a waste insurance clinic offering healthcare in exchange for garbage. UAE follows modular farming practices repurposing brine from desalination. Sri Lanka's has community based mangrove conservation projects. Seychelles balances economic and conservation objectives through its Marine Spatial Planning (MSP) efforts, and Kenya has adopted plastic ban.

Sustainability has been accepted as the core principle of the Blue Economy. The focus is on enhancing investments in the Blue Economy, ensuring capacity building, and sharing technologies through mutual collaborations among the member-states as well as between them and the dialogue partners of IORA.

South Asia

South Asia has made significant progress in the implementation of the Blue Economy. Bangladesh, India, and Sri Lanka participated in the Conference on Sustainable Blue Economy in Nairobi and made national commitments to implement the Blue Economy.

1. Bangladesh

Fisheries is one of the most important sectors of the Blue Economy in Bangladesh. Fish adds upto 15.7% of animal protein consumed globally and the value of fish traded by developing countries is estimated at $25 billion. Marine fish contributes at least 20% of total fish production in the country and about half a million people are directly dependent on this sector.

Shipping and port facilities are considered to be the backbone of the Blue Economy. 80% of global trade by volume and over 70% by value are carried by sea and handled by ports. World seaborne trade is growing by 4% and is projected to triple by 2030. Bangladesh as a coastal state needs to stand out prominently in terms of port facilities and capacities to keep pace with the growing trade.

The main objectives of the Blue Economy in Bangladesh are to promote smart, sustainable and inclusive growth and employment opportunities in the country's maritime economic activities in the short, medium and long-term time frames.

Bangladesh organised an international workshop on the Blue Economy in Dhaka in September 2014, followed by a high-level panel discussion on the side lines of the 71st session of ESCAP in Bangkok. It also hosted a productive International Blue Economy Dialogue in November 2017. In promoting the Blue Economy, Bangladesh has taken a number of steps such as establishing an Oceanographic Research Institute in the Maritime University, and a National Adaptation Programme of Action as part of developing a strategy to better govern marine resources under its 7th five-year development plan, SDGs Implementation Strategy and Climate Change Resilience Action Plan.

The Blue Economy initiative specifically aims to promote synergies and foster suitable conditions that support specific maritime economic activities and their value chains.

Some threats that Bangladesh faces in its smooth implementation of the Blue Economy are: (i) protecting the area from international smugglers and fish pirates; (ii) preserving mangroves and sea grass (iii) addressing climate change and managing carbon emission; and, (iv) managing sea level rise and change in ecosystem and temperatures, and preventing coral bleaching.

2. Sri Lanka

Sri Lanka, an island nation, is strategically positioned in the Indian Ocean amidst major commercial trade routes, encompassing a sea area which is seven times larger than its land area. Owing to the geographical and territorial advantage, it has immense potential in the Blue Economy.

Among the 103 rivers flowing through the country, 90% of the land area is covered by the river basins. The Maritime Zone Law No 22 of 1976 provides for the national jurisdiction of the territorial seas and maritime zones of Sri Lanka. Its EEZ is about 517,000 km2 in extent. The coastal area of the country is home to 25% of Sri Lanka's population.

Fish is the main source of protein in Sri Lanka amounting to 70% of the total animal protein share. In order to meet the demands of adequate supply of fish, sustainable fishery methods like freshwater farming and mariculture need to be encouraged. Sri Lanka plans to establish the Centre of Excellence on Ocean Sciences and Environment, via the Indian Ocean Rim Association (IORA), with the objective of promoting such collaborations among Indian Ocean Rim countries. The initiative aims to enhance the sustainable utilisation of Indian Ocean resources and increase its role in the economies of its member countries.

There are many components under the Blue Economy in Sri Lanka, such as Fisheries and Nutrient Cycling, Marine Tourism, Sea Transportation, Ocean Energy, Co2 capture and storage, Minerals and Waste Management. All of these components aim to explore ocean resources.

3. Maldives

Maldives is one of the many spectacular yet fragile island nations in the Indian Ocean. Its small population of nearly 451,738 lives on a total land area of 298 km2. They spread over 1,190 small (habited and inhabited) islands and are dependent on the seas for their livelihood. Traditional occupation of majority of the people is fishing and tourism.

Maldives is a major tuna fishing nation but the catch has been declining from 100,000 tons in 2006 to aproximately 85,000 tons in the recent years.[53] It imports all its basic needs (except tuna and coconut) but in recent times hydroponics is becoming popular. Maafahi and Thoddoo, which are agricultural islands, have now developed large-scale hydroponics projects, which produce green vegetables and grows mushrooms for domestic need.[54]

Tourism is a growth industry and in 2018 the country received a record 1.4 million tourists, 6.8% increase from 2017. As far as tourist demographics are concerned, Europe dominated with a market share of 49%, Asia Pacific with a 42%, the US 5% and China 19.1%.[55] The new government has taken proactive measures to improve tourism promotion and pledged US$6.7 million, up from US$2.2 million the previous year.

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[53] *"Maldives Fishermen's Association", http://www.ica-ap.coop/AboutUs/maldives-fishermen%E2%80%99s-association (accessed 06 June 2019)*

[54] *"Hydroponics - The Future of Local Farming in the Maldives", https://www.themaldivesexpert.com/5166/hydroponics-the-future-of-local-farming-in-the-maldives/ (accessed 06 June 2019)*

[55] *"Maldives Welcomes Record 1.4 Million Tourist Arrivals In 2018", http://maldives.net.mv/29317/maldives-welcomes-record-1-4-million-tourist-arrivals-in-2018/ (accessed 06 June 2019)*

However, Maldives faces a continuing threat of being submerged from rising sea levels, shrinking coastline and frequent storms. There are fears that by 2050 a majority of the islands in the country could go underwater rendering large population climate refugees.

The new government in Maldives plans to leverage finance for developing the Blue Economy through public and private and impact investments for sustainable tourism and fisheries, as well as agriculture and renewable energy. The Maldives may also explore Blue Bonds by tapping into capital markets to fund ocean-related environmental projects as also other innovative 'blue' financing instruments such as blue insurance."[56]

While visiting Maldives in June 2019, PM Modi stated, "We cannot have a more suitable partner than the Maldives in realising this (that is, Indo-Pacific) vision and for cooperating to benefit from the Blue Economy. Because we are maritime neighbours. Because we are friends." [57]

Gulf

UAE is very active in promoting the Blue Economy. It organised the Blue Economy Summit in January 2014 where the Abu Dhabi Declaration was adopted. It describes the Blue Economy as a tool to promote, inter alia, sustainable development, poverty eradication and climate change mitigation in SIDS and coastal countries. The Declaration stresses the importance of an enhanced mechanism for governing the high seas and urges further development of an integrated ecosystem approach to maintain balanced, healthy and productive marine ecosystems, including valuing blue capital and considering blue carbon trading.

The UAE hosted the Sixth World Ocean Summit in March 2019 in Abu Dhabi. The overarching theme of the Summit was "Building Bridges: Finance, Technology and Innovation, and Governance". The conference discussed finance: the role of sovereign wealth funds; blue carbon systems; Islamic finance and the oceans; aquaculture; a focus on cities and waste management; illegal fishing; and, lessons from land economies. In this conference, more than 500 delegates from over 40 countries participated. This shows that the Gulf region is committed to the promotion of sustainable Blue Economy.

The Sultanate of Oman's vision for developing the Blue Economy encompasses opportunities in Fisheries, Aquaculture, Logistics/Shipping, Offshore Oil and Gas, Offshore Renewable Energy and Marine Mining. Oman is also putting more emphasis on partnerships, especially with the World Ocean Council (WOC). It is seeking the promotion of ocean industries and the adequate investment to advance ocean sustainable development in order to sustain economic diversification goals and the optimum utilisation of its extensive EEZ. Oman is committed to the implementation of UN Sustainable Development Goals.

Thus, the Gulf region is proactive in the implementation of the Blue Economy. The best practices evolved during the discussions and implementation of the Blue Economy in the region can be imbibed by other countries in strengthening the Blue Economy.

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[56] *"Innovative Finance for the Maldives' Sustainable Development"- https://www.oceanactionhub.org/innovative-finance-maldives%E2%80%99-sustainable-development(accessed 06 June 2019).*

[57] *Translation of Prime Minister's Address to the People's Majlis during his State Visit to Maldives (8 June 2019); MEA - https://www.mea.gov.in/Speeches-Statements.htm?dtl/31422/Translation_of_Prime_Ministers_Address_to_the_Peoples_Majlis_during_his_State_Visit_to_Maldives*

Africa

The Blue Economy in Africa widely refers to the economic activities conducted on and off shores, rivers, lakes, oceans, and seas and seabed. It advocates for reconciliation with nature through sustainable production models based on resilience and adaptability. The Blue Economy, though neglected, could provide a way to reduce Africa's dependence on other countries, outside the continent.

Out of 55 African countries, 38 are coastal countries and over 90% of African exports and imports are transported by sea. The territorial waters under African jurisdiction cover a surface of 13 million km² with exclusive economic zones about 6.5 million km² . The continent covers 17% of world's surface of water resources. The Blue Economy has been included in the African Union Agenda 2063. According to an FAO study, the total gross value added of the fisheries and aquaculture sector in Africa is estimated at $24 billion, which is 1.6% of GDP of all African countries. More than 12 million people are employed in fisheries alone, the largest of the African Blue Economy sectors, providing food security and nutrition for over 200 million Africans.

From mining and oil drilling to fisheries, aquaculture, trade and tourism, Africa has an immense untapped potential in its vast ocean and lake resources. Island countries like Mauritius, Seychelles, Cape Verde have already been engaged in the harnessing of the Ocean Economy. The Blue Economy is making considerable progress in island countries that have a greater historical interaction with the sea. The Blue Economy can become a huge job creator, from artisanal fishing to high-end aquaculture, marine biology and deep-sea mining; and, for most African countries, especially island states, the Blue Economy has the potential to drive their economy itself in the coming years.

While policymakers initiate the implementation of the Blue Economy in Africa, there remains a crucial responsibility for the business community to put its views across and drive the agenda. Africa needs to rope in the support of the private sector and SMEs in Africa so that they can play their role in the Blue Economy.

The Africa Blue Economy Forum (ABEF) was held in London on 8 June 2018 and coincided with the World Oceans Day. The forum attracted international experts and African ministers to debate the economic contribution of oceans in the context of the African Union's Agenda 2063 and the UN Sustainable Development Goals (SDGs). According to Paul Holthus, CEO of the World Ocean Council and keynote speaker at ABEF 2018, "Africa presents major Blue Economy investment opportunities and also sustainable development challenges. We are working to bring together ocean business community leadership and collaboration in Africa to address both these opportunities and challenges."[58] The forum also emphasized the importance of the Blue Economy for landlocked economies.

Speakers and delegates at the ABEF 2018 agreed on the need for innovative financing to start developing the Africa Blue Economy on a wider scale, not only from governments, but also from the private sector. Relevant data and more research are required to shape policies, especially with regard to climate change. Focusing on educating Africa's youth is also key to shaping the Blue Economy, which has the capacity to provide desperately needed jobs for the younger generation across the continent.

[58] *Africa Blue Economy Forum, 2018 https://www.abef2018.com/press-release/2018/6/14/blue-is-the-new-green-debut-africa-blue-economy-forum-hits-the-mark-launch-event-attracts-international-experts-to-debate-ways-to-harness-africas-oceans*

The Sustainable Blue Economy Conference, held in November 2018, in Nairobi, Kenya, discussed the current challenges within the Blue Economy. It was noted that Africa as a continent is making significant movement towards the inclusive and sustainable Blue Economy, which has the potential to transform the continent into prosperity and more productive employment for the youth as well as empowerment of the women.

Association of Southeast Asian Nations (ASEAN)

ASEAN pushes forward on marine litter prevention under the Blue Economy. In Bali, Indonesia, a conference was organised on this issue from October 31 to November 1, 2018. ASEAN is active in collaborations with United Nations, Asia Pacific Economic Cooperation (APEC), Norway and Germany to focus on marine litter and micro plastics as well as in achieving the UN Agenda 2030 for sustainable development, especially SDG 11 on Sustainable Cities, and SDG 12 on Responsible Consumption and Production as well as SDG 14 on Life below Water.

ASEAN has many dimensions of cooperation under the Blue Economy: maritime connectivity, renewable energy, maritime resources conservation and coastal management, focusing on the application of the assessment model based on Economic, Environmental and Society's Sustainability. In ASEAN's growth strategy, the concept of the Blue Economy is gaining importance as alternative models of sustainable development that puts the oceans and the maritime at its centre.

Partnerships in Environmental Management for the Seas of East Asia (PEMSEA)

Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) is an inter-governmental organisation operating in East Asia to foster and sustain healthy and resilient oceans, coasts, communities and economies across the region. The members of PEMSEA are: Brunei Darussalam, Cambodia, China, the Democratic People's Republic of Korea (North Korea), Indonesia, Japan, Malaysia, the Philippines, the Republic of Korea (South Korea), Singapore, Thailand, and Vietnam.

The PEMSEA report titled Blue Economy for Business in East Asia towards an Integrated Understanding of Blue Economy[59] identifies nine marine industries and notes that "while the discussion has remained largely the domain of governments, the private sector is showing more interest in the potential that the Blue Economy holds. Indeed, business will play a critical role as its development unfolds." Another important facet of the report is the observation that companies can provide "marine technology and environmental services to cover oil spill response, wastewater treatment, marine scientific services, information technology and data solutions and more."

[59] *Blue Economy For Business In East Asia Towards An Integrated Understanding Of Blue Economy; PEMSEA; (November 2015)- http://www.pemsea.org/sites/default/files/PEMSEA%20Blue%20Economy%20Report%2011.10.15.pdf , p.32.*

Small Island Developing States (SIDS)/ Pacific Island Developing States (PIDS)/Pacific Island Development Forum (PIDF)

Small Island Developing States (SIDS) is a group of 58 islands in which 38 are the members of the United Nations and the rest of the twenty are the non-member states. In IORA, there are five SIDS, namely, Mauritius, Comoros, Seychelles, Singapore and Maldives. The SIDS have been very active in the promotion of Ocean Economy/Blue Economy, but they lack institutional capacity building as well as relevant technology for exploiting the ocean resources.

PIDS is a group of thirteen island states that are the members of United Nations. These states include Fiji, Kiribati, Marshall Islands, Micronesia (Federated States of), Nauru, Palau, Papua New Guinea, Samoa, Solomon Islands, Timor-Leste, Tonga, Tuvalu, Vanuatu.

PIDF is a platform to catalyse, mobilize and mainstream action in support of sustainable development through a green economy in the Pacific Island countries. It is an action-oriented platform to identify innovative solutions, and works closely with international institutions to engage state and non-state actors to develop high impact collaborations on sustainable development through the green economy.

PIDF embraced the Green Growth as its raison d'etre with political support, but since 2017, the PIDF leaders endorsed a statement of regional identity centred around "the Blue Pacific". In Fiji and Vanuatu, Green Growth was adopted in different contexts. In Fiji, the government set out a Green Growth Framework (GGF) in the lead up of the country's first elections in a decade as it borrowed the term to articulate a uniquely Fijian vision for national development. The government also sought to re-position itself on the global stage as a leader in multilateral environmental diplomacy. In Vanuatu, Green Growth was adopted in a Vanuatu syntax, captured in the National Sustainable Development Plan (NSDP), seeking a synthesis between traditional economy or the "Kastom Economy", an idea with long history in Vanuatu focusing on environment and wealth.

In the first high-level Pacific Blue Economy Conference – "Knowledge and Exchange Platform Towards a Blue Economy for the Pacific Islands" – held in August 2017 in Honiara, Solomon Islands, there was a general consensus on the need to rethink the current economic system and to tackle critical issues such as overfishing, increasing marine pollution and climate change. The conference recommended extending Marine Protected Areas (MPAs); countering illegal, unreported and unregulated fishing; strengthening public-private partnerships; adopting policies banning the microplastics and microbeads; and educating and spreading ocean literacy among PIDS.

Fiji

Fiji has legislation and policies for implementation and management of the Blue Economy affairs at the government and industry level. It has also adapted to the WWF's "The Principles of a Sustainable Blue Economy" for the establishment of MPAs, Sustainable Fisheries Management Plans, Sustainable Seafood, Sustainable Tourism. Furthermore, MSP is used as one of the tools for Marine Sector Integrated Planning for some of the marine areas in Fiji as a tool of Sustainable Blue Economy Planning.

At the policy level, the government incentivises sustainable Blue Economy businesses in the private sector and support artisanal and small scale sustainable blue economic ventures. Protection of critical ecosystems and biodiversity underpins national approach towards sustainable Blue Economy. Further, the government supports investments in science & research, and shares data and information with stakeholders.

Australia

The significance of the Blue Economy in Australia's foreign and trade policy is high. Under the chairmanship of Australia, during 14th IORA Ministerial Meeting in Perth on October 9, 2014, the Blue Economy was adopted as a special focus area of IORA.

The contribution of the Blue Economy to the Australian economy has been significant. In 2011-2012, the total contribution of marine-based industries to Australia was AU$ 47 billion (almost double of the previous decade); it is expected to grow to AU$ 100 billion by 2025. An additional $25 billion worth of ecosystem services has been estimated to be provided by Australia's oceans and coasts. Australia's marine industries will contribute around AU$100 billion each year to the economy, with the oceans and coasts providing a further AU$ 25 billion worth of ecosystem services, such as carbon-dioxide absorption, nutrient cycling and coastal protection.

Further, the Blue Economy is projected to grow three times faster than Australia's Gross Domestic Product over the next decade, more than doubling its current contribution of $47.2 billion a year. In Australia, the major ocean industries are: Fisheries and Seafood; Refining of Petroleum from offshore sources; Shipbuilding; Shipping; and Marine Tourism.

Australia has the third largest EEZ. It has been focusing on innovation and sustainable offshore industries through research programmes relating to offshore engineering and technology, seafood and marine, offshore renewable energy system, environment and ecosystems, and sustainable offshore development.

Australia is preparing to host the Australian Marine Science Association conference to focus on health of the oceans and marine life; economic and societal benefits; and, critical Blue Economy challenges. Australia is also seeking collaborative partnerships between industry and marine researchers. Australian universities are focusing on academic and research work on how to achieve a Sustainable Blue Economy.

The foregoing review of developments across the regions indicates that there is growing acceptance of the principles of Sustainability and Inclusivity as well as the imperative to promote the Blue Economy in all its dimensions.

4.4 A Mosaic of Good Models

1. Holland and Water

The Dutch are at home in water. The Netherlands has Europe's largest port capacity and operates Europe's largest inland shipping fleet. The lowest point in the country's low-lying delta region is almost seven meters below the sea level. Almost 100% of the people have access to clean, chlorine-free drinking water, and 99% are connected to the sewage system. Holland has about 2,000 companies in the Dutch delta and water technology sector. A few of them of interest are:

- **Seaweed** has multiple usage in foodstuffs, biofuels and water purification. Large-scale cultivation of seaweed at sea could increase its production worldwide. Hortimare is a company that can help: www.hotimare.com
- **Dredging** is essential when rivers and coastal areas need to be made and kept navigable, but it should be environment friendly. New technologies have come in; Ecoshape is a place to go to: www.ecoshape.ne
- **Efficient sewage system** is the requirement of many cities and towns. Neredannop offers a new technology: www. neredannop.nl/English
- Everyone may not know much about the quiet power of the ocean, but it exists - and it can be utilised. An ocean is a reservoir of both warm and cold water, an exchange between them produces energy that can be put to many uses for humankind. How? Bluerise are the people to turn to: *www.blurise.nl*

2. Women and Ocean Science

To explore the avenues of the Blue Economy, Ocean Science is our invaluable tool. Without making full use of science and technology, it is impossible to fathom the secrets of oceans and unlock their wealth. Please see *https://en.unesco.org/gosr.*

But the problem is that in this age of heightened attention to gender equality and women empowerment, very few women enter the field of Marine Scientific Research (MSR).

To address this gap, the following programmes provide capacity building opportunities:

1. United Nations Nippon Foundation Thematic Fellowship, administered by the Division for Ocean Affairs and the Law of the Sea (DOALOS), United Nations. Please visit: www.un.org/Depts/los
2. Nippon Foundation Fellowship Programme administered by DOALOS
3. H.S.Amerasinghe Fellowship administered by DOALOS
4. ISA Endowment Fund for scientists and government nominees
5. Trust Fund for Fisheries management administered by DOALOS and FAO
6. International Seabed Authority (ISA) through its Endowment Fund. Please visit: *www.isa.org.jm.*
7. Rhodes Academy of Oceans Law and Policy, annual one month course.

3. Blue Tourism: The Palau Pledge

Scenic islands and picturesque coastal regions need tourists, but they fear the litter, pollution, and damage left behind. Palau, a Pacific archipelago, became the first nation on the earth to change its immigration laws for the cause of environmental protection.

Tourists, on entering the country, sign a pledge to act in an ecologically responsible way for the sake of its children. Every tourist who takes the pledge needs to follow a sustainable tourism checklist or risk a fine. He/she promises the locals: "The only footprints/I shall leave are those/that will wash away./"

Source: *The 'Palau Pledge,' a Small Nation's Bold Environmental Effort, Just Won a Top Global Ad Honor (April 2018); Adweek Network- Please see the full text at: https://www.adweek.com/creativity/the-palau-pledge-a-small-nations-massive-environmental-effort-just-won-a-top-global-honor/*

4. South Africa's Operation Phakisa

Operation Phakisa, launched in July 2014, is an adaptation of the "Big Fast Results" methodology that was first implemented in Malaysia. This operation is based on an innovative and pioneering approach to implement policies - better, faster and more effectively. South Africa follows an integrated, target-oriented, and time-bound approach to achieve the full potential of Blue economy. The oceans sector contributes 4.4% to the GDP, with value chain making the largest contribution.

Source: *"Operation Phakisa"Oceans Economy; Aquaculture Portfolio Committee; Republic of South Africa (October 24, 2017 - http://pmg-assets.s3-website-eu-west-1.amazonaws.com/171024phakisa.pdf*

5. Norway's Initiatives

With 80% of its population living within 20 km from the ocean, Norway shows the way in making the Blue Economy an integral part of its foreign, development and economic policies. Prime Minister Erna Solberg is a believer in and champion of the need to realize the full potential of oceans for humanity's benefit. "We will not be able to realize this potential without sustainable growth in ocean-based industries," she said in New Delhi in January 2018 . The Norwegian government:

- Established a high-level panel on Building a Sustainable Ocean Economy, which is co-chaired by the PM of Norway and President of the Republic of Palau. It includes leaders from coastal states: Australia, Chile, Fiji, Ghana, Indonesia, Jamaica, Japan, Mexico, Norway, Palau and Portugal. The panel has been deliberating on steps to deal with the global ocean crisis, including development issues, namely, sustainable fisheries, ocean-based energy solutions, tourism, new approaches to marine protected areas, and the ocean economy.
- Doubled its allocation on programmes around the world to combat marine litter to NOK 280 million ($ 6.8 million). Please visit *https://sst.org.za/news/norway-leads-investment-in-blue-economy/*
- Pursues an ocean strategy based on three pillars. *http://www.marinebiotech.eu/sites/marinebiotech.eu/files/public/1-01%20Jartrud%20Steinsli.pdf*
- Highlighted the following key points through Prime Minister Erna Solberg's inaugural address at Raisina Dialogue on 8 January 2019:

- Norway favours moving towards integrated ocean management, instead of managing the ocean sector by sector. The objective should be to trigger, amplify and accelerate action to promote ocean protection and productivity. "Our goal is to advance a new contract that will both protect the oceans and optimise their value to all people."
- One of the goals of Norway's ocean strategy is to promote sustainable value creation and employment in the ocean-based industries.
- Norway's ambition is to facilitate the transfer of expertise and technology across industrial sectors.
- The India-Norway Ocean Dialogue, launched on 8 January 2019, would be "an excellent tool" to establish cooperation that shares both benefits and burdens."

6. Canada and Blue Economy

A maritime nation, Canada has the largest coastline in the world. It was a co-host, together with Kenya and Japan, of the Sustainable Blue Economy Conference in Kenya in November 2018. "The conference was an example of multilateralism at its best," said Prime Minister Justin Trudeau. He stressed, "Only by working together can we build a Blue Economy that is prosperous and sustainable, and leaves no one behind."

Canada announced support for the UN Decade of Ocean Science as well as funding for the UN Special Envoy of the Ocean. During its presidency of G7, it launched the Ocean Plastics Charter to eradicate plastic pollution.

(https://www.canada.ca/en/environment-climate-change/services/managing-reducing-waste/international-commitments/ocean-plastics-charter.html)

Canada runs its $1.5 billion National Oceans Protection Plan. It has elements that are highly relevant for the needs of other countries, including India.

(https://www.tc.gc.ca/media/documents/communications-eng/oceans-protection-plan.pdf)

7. Ocean/Maritime Clusters

Leadership and Collaboration for Ocean Sustainable Development and Implementing the Sustainable Development Goals

Ocean/Maritime Clusters are geographic concentrations of similar/related maritime firms, which share common markets, technologies, worker skill needs, often linked by buyer-supplier relationships, which need to focus on sustainable development. This paper elucidates how WOC ensures a) conditions and characteristics that lead to Maritime Cluster success; b) best way to contribute to SDGs; and c) opportunities for collaboration among clusters.

Ocean/Maritime Clusters and sustainable ocean development can be analyzed in relation to the three key spheres of Innovation, Competitiveness-Productivity-Profit and Environmental Impact. Also, the clusters work to advance the role of the private-sector leadership in ocean's sustainable development as well as the Blue Economy.

According to the paper, there are four key concepts underpinning to create successful maritime clusters - Leadership (Business-oriented vision and charisma and Management team); Action (Concrete goals, Solid, reliable funding and Action plan); Cluster Environment (Opportunities for collaboration, Network); and, Value Proposition (Sustainability as Value: Triple Bottom Line, Future trends).

Source: *World Ocean Council White Paper on Ocean/Maritime Clusters (February 2018)- Dr. Eric Rolf Hansen | Paul Holthus | Christopher L. Allen |Jeeho Bae | Judy Goh | Cristina Mihailescu | Claire Pedregon World Ocean Council White Paper- Dr. Eric Rolf Hansen | Paul Holthus | Christopher L. Allen Jeeho Bae | Judy Goh | Cristina Mihailescu | Claire Pedregon en, D. E. (Februray 2018)*

https://www.oceancouncil.org/wp-content/uploads/2018/03/Ocean-Maritime-Clusters-and-Sustainable-Development-WHITE-PAPER-FINAL-2018-logo.pdf

8. Ocean Governance and The Private Sector

Ocean Governance (OG) is the foundation of rules, institutions, processes, agreements and arrangements based on which economic activities are undertaken to make responsible use of ocean space and resources. The White Paper on Ocean Governance and the Private Sector by World Ocean Council talks about the importance of engaging the international ocean business community in OG.

Ocean economic activity drives the need for changes in OG and is the target or recipient of that governance. It is thus necessary for the private sector to be involved in the development and improvement of OG.

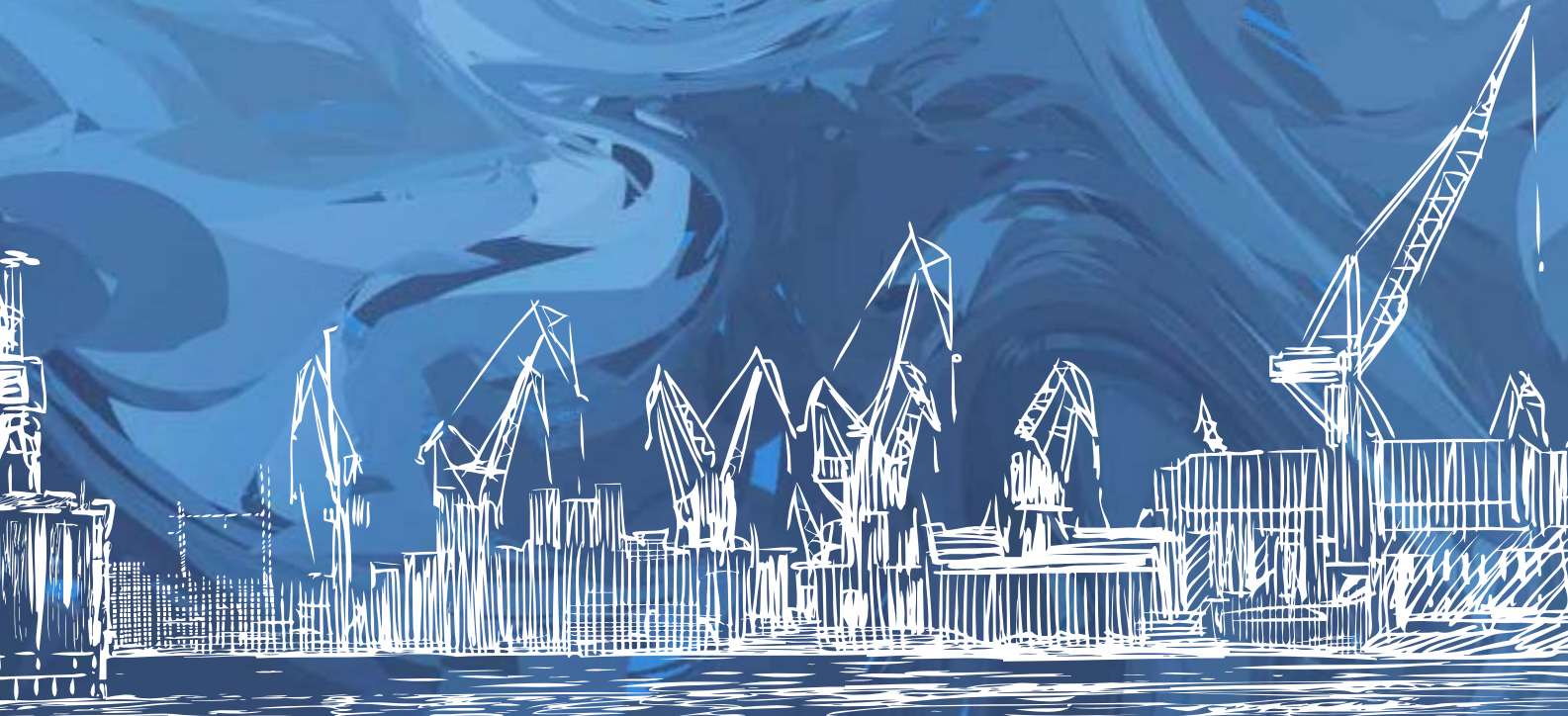
WOC, since 2009, has been monitoring major ocean policy and decision-making processes to improve the level of industry involvement in OG. WOC also makes sure that the ocean industries are aware of the major international ocean policy and governance processes. It also engages with the World Ocean Assessment (WOA) including recruiting industry experts to participate in the assessment.

Source: *White Paper on Ocean Governance and the Private Sector | World Ocean Council | Paul Holthus | June 2018*

https://www.oceancouncil.org/wp-content/uploads/2018/06/WOC-White-Paper-Ocean-Governance-and-the-Private-Sector-final.pdf

5

Inputs from Stakeholder Consultations in Coastal States of India



Inputs from Stakeholder Consultations in Coastal States of India

Considering that India has a long coastline, ocean-based trade and economic activity have a great potential to create profitable business opportunities for coastal states of India and contribute to inclusive economic development. In this context, stakeholder consultations on Blue Economy were organised in Kerala, Gujarat and Andhra Pradesh in partnership with the Government of Kerala, Gujarat Maritime Board, Government of Andhra Pradesh and Konrad Adenauer Stiftung, respectively, involving stakeholders and key decision makers from the Blue Economy sectors. The objectives of these consultations were to identify priorities and issues, and generate recommendations in order to develop the sectors of the Blue Economy, facilitate trade and industry development in the states of Kerala, Gujarat and Andhra Pradesh and form international linkages. The following schedule of consultations was adopted:

1. Kochi, July 6, 2019
2. Ahmedabad, July 16, 2019
3. Amaravati, September 11, 2019

Section 5.1: Report on Kerala Consultation

Natural Advantages

- Strategically located, with 590 kms coastline, Kerala is one of the leading maritime states of India. Besides being located on the principal national trade corridor, Kerala is blessed with rich natural resources, quality work force and good health standards;
- Kerala has a long history of ports and shipping, and other marine activities, including coastal tourism, fisheries and marine manufacturing;
- The state is ideally suited for knowledge-driven industry and services, including logistics, food processing, marine research, marine industrial designing, sustainable tourism and big data aggregation and applications;
- Being a coastal state and with a long history of exposure to the global cultural diversity and values, public opinion in Kerala is better prepared to appreciate the need and merit of promoting sustainability;
- Pressures of economic growth and employment generation would demand Kerala to give much higher priority to the economic harnessing of their ocean resources, especially ports and shipping, marine manufacturing, fisheries, tourism and marine research. At the same time, these initiatives will need to be fully sustainable for preserving these vital resources in the long run, which converts Kerala into a prime mover of Blue growth in India.

Blue Economy: Growth Sectors

Shipping, Ports and Logistics

- Port-driven development is important for India and Kerala has enormous opportunities. Massive scope for development, expansion and up-gradation of ports to cater to growing traffic; improving efficiency and capacity of the existing ports could attract more trans-shipment traffic, currently using ports of neighbouring region;
- Kerala coast is dotted with 17 ports. Kochi is one of the largest international port complexes in India, with the first international trans-shipment terminal with an installed capacity of around 4 million TEUs. Cochin port also has an integrated LNG terminal. There are three intermediate ports and the remaining are minor ports. Vizhinjam near Trivandrum, scheduled to be commissioned soon, would be the second international port in Kerala. It would have the capacity of handling over 4 million containers annually and accommodate super sized ships of 18,000 TEU capacity. The new port would provide a major container transit facility besides receiving cruises;
- Cochin Shipyard is the biggest in India; it can build ships upto 85,000 DWT capacity, also has a repair dock where ships with 100,000 DWT capacity can be handled. This capacity and capability should be promoted for greater cooperation and market access in IOR;
- The participants made important recommendations for further improvements in the shipping and ports sector, namely, a) developing bunkering facilities for international vessels and cruises and this could become more attractive by practical reforms to the existing taxation norms and rates; b) adapt inland waterways for barges to connect ports with hinterland, which would open new economic opportunities and reduce pollution on account of inefficient road transport; the waterways need regular maintenance and dredging; c) Kerala could evolve as a major destination for global and domestic cruises; last year Cochin Port handled 49 cruise vessels and with better port facilities and the new port at Vizhinjam, this number can grow several fold; and, d) there is a good potential for the development of coastal cargo movement and inland waterways of Kerala which is still underutilized.

Tourism Ecosystem Combines Leisure with Wellness

- Called 'God's own country', Kerala has been a role model for developing an integrated tourism ecosystem which combines leisure with heritage, nature and wellness. The state is a global leader in successfully integrating tourism with AYUSH and nature. In 2018, the state received over 16.5 million tourists bringing over Rs 36,500 crores in revenue. Majority of tourists were from within India, international tourists were a little over one million;
- In spite of the State being a leader in tourism, the participants felt that the State was largely underperforming for reasons such as poor connectivity, infrastructure, hygiene and general safety. They recommended: a) develop Cruise tourism, including downstream and up-stream economic integration which could open up new business opportunities with high-value jobs; b) Kochi port is the leader in cruise tourism in India and the sector has immense growth potential. It is just in a nascent state and further growth will need public-private partnerships for developing seamless linkages between the cruise and land-based tourism, including better coastal crafts and obstruction free near coast routes. Kochi-Kozhikode coastal route could be developed as the first modern and regular ferry route; and c) better connectivity is a pre-requisite for developing and promoting new destinations; there is an urgent need for: cleaning and dredging of water channels; better and easy berthing facilities for cruise liners and

coastal passenger craft; multimodal connectivity between cruise, road and helicopter services; safety, security and hygiene. These improvements can help target higher value tourists.

Fisheries, Mariculture and Aquaculture

- Kerala is heavily dependent on the fisheries for growth, food security, exports and large-scale livelihood. Fishing is perhaps the oldest economic activity by the coastal communities and constitutes an important component of their socio-cultural practices;
- Kerala has a coastline of 590 km, a continental shelf of 39,000 sqkm, an exclusive economic zone of 220,000 sqkm, and an inland water spread of around 4 lakh ha, caters to all important sources of fish. There are 222 marine fishing villages and 113 inland fishing villages in the State providing livelihood to a vast majority of population;
- The total fish production in Kerala during 2016-17 was 6.76 lakh tones- marine fish landing accounting for 4.88 lakh tonnes and inland fish production was 1.88 lakh tonnes;
- Fisheries and aquaculture contribute around 8.5% of the Gross State Value Added (GSVA) from the primary sector which is of significance to the State economy.
- During 2015-16, export of marine products from Kerala was 159,141 tonnes valued at Rs 5,009 crore;
- Although the fish catches from Kerala coast include more than 300 different species, the commercially important ones are about forty only. Prominent among them are seer fish, pomfret and prawn;
- The stakeholders from Kerala were fully conscious of the need for promoting sustainable practices in the sector namely: a) respecting the carrying capacity of the marine ecosystem; b) waste reduction at every stage of catch and processing; c) promoting hygiene and quality assurance; d) developing cold chains to enhance shelf life; e) traceability; f) exploring off-shore mariculture; and f) more efforts for deep-sea fishing;
- In terms of best practices, the participants spoke about several case studies, principally: a) the State fishing law which provides a comprehensive framework for fisheries growth with sustainability, they suggested that similar laws should be replicated by other coastal states, b) Cochin Shipyard has developed an efficient and inexpensive design for retrofitting of the existing fishing boats for deep sea operations; 16 such adaptions have been carried out for demonstration, and this could be further expanded at a larger scale, c) The Petronet LNG terminal at Kochi has facilities for developing cold chains and this capacity could be integrated with the sea food supply chain, and d) Kerala also has a fairly good system of promoting grassroots level empowerment of fishing communities, especially women;
- Important recommendations for improvement were: a) promote new areas and higher value species mix in aquaculture, ensuring less polluting feed; b) greater regulation on imports of non-native species; c) promote mandatory quality standards, certification and traceability; d) promoting deep sea fishing, e) greater control of illegal and unreported fishing; f) developing cold chains to reduce waste; and g) explore co-culture of paddy with fish/prawns.

Marine Research

- Science and technology differentiate the Blue Economy from Ocean Economy and Kerala is ideally placed in generating knowledge;
- Marine Biotechnology is another important sector which needs to be developed carefully;
- There is a need to strengthen R&D to make the Blue Economy a priority;

- Kerala University has started a full programme for marine sciences. It could be useful to open these courses for regional capacity building through the MEA's scholarships and ITEC programme.

The Way Forward

- A one-day conference on the identified sectors to examine precise approaches for promoting and practicing the Blue Economy in the State. The State authorities were willing to partner with FICCI to carry the process further to the ground practitioners, along with an exhibition. FICCI could finalise the dates in consultation with the State and other stakeholders;
- FICCI intends to set up the Blue Economy Awards for industry members who are leaders in the Blue Economy sectors and have championed the cause of sustainability in their business practices in Kerala;
- FICCI could follow up on sectoral recommendations with the concerned government and business entities for concrete action;
- Commitments from three partners for continued collaboration with the FICCI Task Force for a follow-up including focused sectoral conferences from Director, Industries Department, Chairman, KSIDC, and the Kerala Maritime University.

Table 1: Industry Response collected from the survey conducted at the Stakeholders Consultation on Blue Economy, Kerala, July 6, 2019

Sectors	Industry Suggestions
Fishing	• Labour employment in Fisheries sector • Fish value-chain analysis and intervention.
Tourism and Leisure	• Backwater tourism to be coupled with tourism using solar boats, which can be used for both travel and fishing • Government support and subsidies are essential in coastal shipping and tourism • Cruise tourism, inland waterways and backwater tourism • Inland waterways should be utilised for tourism and cargo transport • Use of solar powered boats.
Construction	• Heights of bridges are an obstruction to transport in local canals, which should be dealt with.
Shipping, Port and Maritime Logistics	• Development and conservation of backwaters; maintenance sheet and infrastructure required to keep the backwaters clean and navigable.
Others	• Encourage the use of LNG as a fuel instead of diesel, tax benefits for the use of LNG, policy regulations for quick clearance of LNG as a fuel • Blue Economy consultation on Skill Development • Pollution and sewage control and water treatment • Development of local markets; set up pre-processing centres.
Future Consultations to be held	• Business conference on Blue Economy to be organised specifically on Fishing, processing and exports • Business Conference on Blue Economy on Shipping and Logistics • Human Resource Development.

Section 5.2: Report on Gujarat Consultation

Natural Advantages

- Blue Economy, a new paradigm, mainly refers to the sustainable harnessing of oceanic and other water body resources and assets, which ensures economic growth with environmental sustainability. Ocean-based trade and economic activities have great potential to create profitable business opportunities for coastal states of India and contribute to inclusive economic development;
- Strategically located with 1600 kms coastline, the longest among the coastal states of India, continental shelf of 1,64,000 sq kms, EEZ of 2,20,000 sq kms, 47 ports (major, minor), fairly established maritime manufacturing, Gujarat is the nearest maritime outlet to Middle-East, Africa and Europe;
- Gujarat also leads in the seafood industry and trade;
- State is building a coastal tourism base, including the cruise industry;
- The first state in India to go for off shore wind energy;
- Gujarat also has a long history of maritime trade with the entire Indian Ocean region;
- As already a leader in the port-led development, Gujarat is determined to further expand other maritime sectors, but with a very high priority to sustainability, which makes Gujarat a pioneer state for developing BE sectors.

State of BE Sectors

Shipping, Ports and Maritime Logistics

- Gujarat is endowed with rich BE assets;
- Key strengths include: a) major part of Delhi-Mumbai Freight Corridor (DMFC) will pass through Gujarat, b) high priority to port-lead growth by linking backend SEZs and industrial clusters, c) success in developing ports under all possible business models, namely, PPP, product-based, etc, d) high-capacity utilisation, e) ease of doing business through simplification and facilitation (IPMS/VTMS);
- Out of 47 ports, 46 are non-major ports. Kandla is the only major port. Gujarat constitutes 32% of the total national cargo handled by non- major ports. During the FY 2007-2016, cargo traffic in Gujarat increased at a CAGR of 10.17%, with the cargo volume handled reaching 440 MMT in FY16. Kandla port handled 499.68 million tonnes of cargo traffic, during April 2016 to January 2017;
- The emphasis of the state on BE is evident from the fact that they are the pioneers in setting up a maritime university for creating BE skills;
- The strategy for future BE growth includes promoting coastal shipping, ferry services, green field port development, greater mechanisation for cargo handling, integrated logistics, bunkering facilities, port connectivity, maritime clusters, shipbuilding and repair, and offer dedicated ports to other land-locked states.

Fisheries, Mariculture and Aquaculture

- Gujarat is one of the top seafood producers in India. The fisheries set up includes: over 25,500 marine fishing boats, active fishermen population of over 2,18,000, a series of good quality landing stations, a well-developed processing industry and supply chains;
- Gujarat produces marine catch of over 700,000 tons whereas the inland catch was 1,38,000 tons last year, which is highest in India, there are more than 100 processing units in Veraval and Porbandar, whereas new areas are coming up in Surat, Navsari, Valsar where brackish water aquaculture is being developed;
- The marine catch has reached a stagnating level and growth may further drop for meeting the vitality of fish stocks. There is an urgent need to promote deep sea harvesting, for which the state is already supporting by way of trawler development and other capacity building programmes. Gujarat has approved the construction of 100 boats for the capturing of tuna fish in the deep sea, but this needs to expand also with induction of better technology;
- Gujarat also needs to expand aqua- and cage-culture programmes by using brackish water as well as multi-tier off shore cage culture, which could enhance the yield several fold. Due care would be needed for developing non-polluting feed, disease control and seeds;
- Gujarat's contribution to the seafood exports is close to Rs 5000 crores and this could grow by improving standards, hygiene, cold chains, expansion and improvements of landing stations;
- A need was felt was better management of marine space to avoid growing inter-sectoral conflicts. Growing number of fishing boats is already causing crowding of space and communications bands.

Tourism Ecosystem, Leisure and Wellness

- Gujarat is one of most visited states in India, with the total number reaching close to 4.5 million by end 2017, of this, close to one million were foreigners and NRIs, Gujarat is rich in a wide variety of tourism resources, including nature, wildlife and beaches. The Rann of Kutch has emerged as an important destination, Gujarat is also aiming to develop cruise tourism in a big way;
- There is a need to tie-up with international tourism bodies in order to build partnerships with cruise companies. This could open new possibilities, especially as many other traditional cruise hotspots are seeking to decongest to address over-tourism. There are opportunities for both coastal and deep-sea cruising. There is also a need to develop water activities as also integrated coastal tourism facilities;
- Gujarat has identified Dwarka, Okha, Porbandar, Veraval and Mandvi for cruise calls. Also, a cruise is being launched from Surat to Mumbai very soon.

Offshore Renewable Energy

- Gujarat has been a front-runner in promoting renewable energy, both solar and wind. The State is the first for calling tenders for off-shore wind for 1 GW, as part of GOI's plan for 30 GWs till 2030;
- The participants were very optimistic about Gujarat taking lead in this sector. However, there was a practical suggestion related to the cost of installation and extraction. They advised that the sector should be provided with the facility of fixed feed in tariffs for the initial transition period, as was done with land-based renewables. Otherwise, viability gap could become a dampener.

Marine Education and Research

- Being a major maritime state, Gujarat is attaching the highest priority to developing relevant skills. The Ganpat University is already offering a master's programme in maritime technology. The State is planning to set up a new university, which would offer courses in all maritime sectors, including trade law. Even regular educational institutions have added naval architecture and nautical science as subjects. The participants suggested that science of sustainability should also be included in the various maritime courses;
- The participants agreed that Marine Biotechnology is critically important for big coastal countries to pay attention now. Gujarat, with its good capacity in pharmaceuticals, should play a lead role;
- There was some discussion on developing desalination technology but only for emergency situations. It was appreciated that the desalination should be treated as the technology of last resort, the first preference being water harvesting and conservation.

The Way Forward

- The stakeholder's consultation generated immense interest in the importance of integrating sustainability with all economic activity. The conference sought to continue with this dialogue for which FICCI should consider organising sectoral interactions for precisely identifying the opportunities, challenges, solutions and advocacy;
- The recommendations of the conferences would need follow up with the concerned state and GOI authorities;
- Arrange to publicise the best practices for technology and benefits demonstration.

Table 2: Industry Response collected from the survey conducted at the Stakeholders Consultation on Blue Economy, Gujarat, July 16, 2019

Sectors	Industry Suggestions
Fishing	• Price regulation in aquaculture • Clear-cut guidelines on the export of shrimp food, protein concentrate • Hygienic transport and export permit and inspection in the aquaculture sector • Policy and grants for agriculture and aquaculture farmers.
Marine Biotechnology	• Easy availability of cold chain facility • Protect marine ecology and develop biodiversity.
Construction	Revive dead jetties, terminals and harbours.
ICT	Technological advancement, inter-department integration.
Shipping, Port and Maritime Logistics	• Development of parts, ship-building and maintenance • Ship-breaking must be addressed under the Blue Economy.

Sectors	Industry Suggestions
Renewable Energy	Suitable sites for offshore renewable energy.
Marine Education and Research	• Ease maritime training rules; training on inland vessels; short-term certification courses • Short-term skill development maritime course • Courses on marine biology and inland vessels.
Others	• Realisation of export proceeds through third party multiple transactions • Outcomes of R&D projects need to be assessed; innovation and revenue generation need to be promoted • Land allotment policy of the state • Certification of CAA without many barriers and bank support to promote Blue Economy • Removal of red tapism in exports (EIA) • Linkages between innovation and industry are required.
Future Consultations to be held	• Development of parts, ship-building and maintenance • Conference on aquaculture • Technological aspects of fish-seed production • Seafood exports and how to get over the hurdles • Shrimp farming • Sea-weed cultivation.

Section 5.3: Report on Andhra Pradesh Consultation

Natural Advantages

- With a coastline of 974 kms, second longest for any state in India, over 33,000 km2 of rich continental shelf, nine coastal districts and its strategic location as a gateway to the East and Southeast Asia, Andhra Pradesh has a strong desire for developing a variety of the Blue Economy sectors for economic growth and livelihood. This priority is fully reflected in the State government's vision and significant initiatives for ocean-led sectors;
- Andhra Pradesh (AP) is amongst the top sea food producers and exporters in India and is aiming at further major improvements, both for quantitative and qualitative growth;
- Coastal tourism, including the cruise industry, is a priority sector for the State. They are working on a comprehensive plan to expand tourism infrastructure and quality services;
- As a part of the Sagarmala project for port-led growth, and with its long coastline, several locations with ideal draft and long experience of managing some of the best ports in the country, Andhra Pradesh rightly aims to emerge as a hub for East and Southeast Asian connectivity;
- Andhra Pradesh has set up a maritime board to better coordinate its BE vision, initiatives and programmes.

State of the BE Sectors

Shipping, Ports and Maritime Logistics

- Major enablers for the sector include: a) proposed freight corridor to connect Vijayawada in Andhra Pradesh and Kharagpur in West Bengal. Once complete, this 1114 kms East Coast Corridor is expected to carry 200 MMT of freight, b) the State is working on providing better road and rail connectivity to their ports and has invited companies from neighbouring states of Telangana and Chhattisgarh to use Andhra

The 974kms long coastline would shore up an array of opportunities in development of ports besides aquaculture giving a boost to Blue Economy. We would love to collaborate in infrastructure development, oil refinery, steel plants, water management, interlinking of rivers as ours is a Riparian State, clean drinking water plants and reforms in transport system by phasing out diesel-run buses and moving on to energy-powered buses. We also plan to give a boost to maritime economy where the opportunities are wide open for investment.

Shri Y.S. Jagan Mohan Reddy, Hon'ble Chief Minister of Andhra Pradesh

Pradesh ports for trade, c) presence of excellent facilities for shipbuilding, repair and breaking, d) good potential for developing effective multimodal connectivity;

- Out of 15 ports in Andhra Pradesh, 14 are non-major ports. Visakhapatnam is the only major port. The State is endowed with three deep draft ports, namely Visakhapatnam, Krishnapatnam and Gangavaram, which can attract and manage bulk cargo. At present, only six ports are fully operational and if optimally developed, these ports could easily contribute up to 12% of the GSDP;
- Nationally, Andhra Pradesh stands at fourth position in overall cargo handling. In 2016-17, the State handled a total of 131 MMT of cargo of which 61 MMT was by the Visakhapatnam port. Central Government has offered to build another major port at Vedarevu and the Chief Minister has recently announced their intention to convert Machilipatnam into a major port. These initiatives could add significant capacity and efficiency to the sector;
- Andhra Pradesh has also evolved into a major ship-building centre in India. Hindustan Shipyards Ltd (HSL), Visakhapatnam is a premier PSU, which builds a wide range of vessels, including petrol craft and submarines. It also has extensive repair facilities. HSL has built over 180 vessels and has repaired close to 2000 with varying capacities and specialisation. There are private companies involved in building smaller coastal boats and barges;
- Andhra Pradesh has also developed good ship-breaking capacity, including the environment-friendly technology which obviates beaching of such vessels.

Fisheries, Mariculture and Aquaculture

- Andhra Pradesh is one of the largest fishing states and a pioneer in aquaculture. While over 0.6 million fishermen are involved in marine fisheries, fish/sea food farming is leading the way;
- According to an ICAR report, Andhra Pradesh has over 0.5 million hectares of fresh water ponds/tanks, 11,500 kms of rivers and canals, 0.46 million hectares of reservoirs and 150,000 hectares of wet lands suitable for aquaculture. The State ranks third in global shrimp production;

- Andhra Pradesh is setting up a world class aquatic quarantine facility and Brood Stock Multiplication Centre at Bangarammapeta at a cost of ?680 million. The State is also home to close to 400 hatcheries producing sufficient shrimp seeds for their needs and some surplus. These facilities will significantly mitigate the pathogen problem and further help expand brackish water aquaculture;
- Andhra Pradesh leads in total fish and shrimp culture in India, it produces over 70% of the cultured shrimp nationally;
- During 2016-17, Andhra Pradesh was responsible for exports worth ?170 billion of seafood from India, out of a total of Rs 370 billion.

Tourism Ecosystem, Leisure and Wellness

- Andhra Pradesh has been the third most popular tourist destinations in India for quite some time and the sector is witnessing robust growth. Thirteen districts have been divided into five tourism hubs, including beach, backwater and eco-tourism;
- Andhra Pradesh has received the 'Best State for Comprehensive Development of Tourism Award' from the Union Ministry of Tourism for two consecutive years. The sector has attracted major domestic and foreign investment interests. Tourism sector is emerging as a top contributor to the State's economy and job creation. With total tourist footfall exceeding 150 million, the state government is giving high priority to financial support for developing quality tourism infrastructure, safety, hygiene, publicity and hospitality skills;
- Andhra Pradesh is also emerging as a major cruise destination. A modern cruise terminal with world class facilities is coming up at Vizag at a cost of ? 800 million.

Marine Education and Research

- Andhra Pradesh is home to a branch of Central Marine Fisheries Research Centre at Visakhapatnam, which is carrying out R&D to develop sustainable fishery practices, cage culture, brood multiplication, disease control and monitoring, usage of telemetry and satellite imagery for marine spatial applications. Andhra University, Visakhapatnam, Department of Marine Living Resources, is offering Master's and Doctorate level studies and research in fisheries and Marine Biotechnology. There is also a campus of the National Institute of Ocean Technology at Nellore. This centre carries out research in a range of ocean sciences.

The Way Forward

- Andhra Pradesh is already very conscious of the need to promote sustainable practices in all economic activities. They have taken the lead to set up a maritime board to facilitate and coordinate implementation of relevant policies and programmes. They were very keen to take forward the dialogue with the industry as a follow up to the consultations. Andhra Pradesh is keen to host a state level conference on BE, along with an exhibition. FICCI should coordinate with the State authorities for ensuring that the proposed conference and exhibition are organised well and with effective participation;
- The participants sought support from FICCI for further improving the marine skills through exchange programmes within India, regionally and globally. This must be followed up with the state authorities and industry;

- Andhra Pradesh is keen to introduce essential elements of marine spatial planning and needs to identify best practices for developing suitable road map;
- The State is also keen to seek global cooperation for biological control of diseases to avoid excessive use of antibiotics. They are also keen on developing quality assurance, hygiene and traceability frameworks;
- Andhra industry seeks collaboration for developing cold supply chains for minimizing post harvest losses, as also for brand building;
- Ship-breaking industry in Andhra Pradesh has developed processes which do not need beaching. This is an environment-friendly approach. They are also using the high quality metal from breaking in building smaller coastal boats and barges, suitable for coastal and inland waterways. This deserves special attention for developing and improving the inland waterways, multimodal connectivity and more effective regulation;
- Some participants sought FICCI's good offices to ease and facilitate long-term business visas.

Table 3: Industry Response collected from the survey conducted at the Stakeholders Consultation on Blue Economy, Andhra Pradesh, September 11, 2019

Sectors	Suggestions
Fishing	• Aquaculture centres to be opened up • Diversification of aquaculture • Quality testing of products • Value addition and expansion of exports.
Construction	Desilting of canals.
ICT	Technology has to be developed.
Shipping, Port and Maritime Logistics	• One regulatory centre for major and minor ports • Subsidies for setting up logistics facilities.
Others	• Overcome the challenges of Sagarmala finance issues • Private-public partnership • Simplification of labour laws, ESIC • Coastline zoning • Ease of doing business.
Future Consultations to be held	Blue Economy sectors including Manufacturing and Processing; Fisheries; Logistics; Ship Breaking; Mariculture; Marine Spatial Planning

6

Sectoral Opportunities – India and International

Sectoral Opportunities – India and International

This section presents a detailed analysis of the sectors that constitute the core elements of the Blue Economy, in the opinion of the Core Group. It offers a snapshot of the prevailing situation as well as outlining specific areas where business and industry may find suitable opportunities for growth.

6.1 Fisheries and Aquaculture

Fishing would have been amongst the very early human activities near/on the oceans for food, livelihood and recreation. Like the other economic sectors, fishing, with the passage of time, has also benefitted from extensive mechanisation and technology induction, expanding the reach and efficiency of the operations. Human beings have succeeded in exploiting almost any distance or depth, exceeding the carrying capacity of the resource ecosystems. In many cases, the higher yields have come at a massive cost to the survival of fish stocks and essential marine biodiversity. Aquatic biodiversity which accounts for over 80% of the planet's biota, is also under threat from growing ocean pollution, acidification and warming. These challenges have been at the very heart of the SDGs seeking, among inter alia, to promote more sustainable fishing practices so that the yields grow hand in hand with the health of the marine ecosystems. Sustainable fishing also constitutes an important traditional pillar of the emerging paradigm of the Blue Economy, which is essentially premised on the principle that sustainability ensures longevity and quality of the nature's bounty.

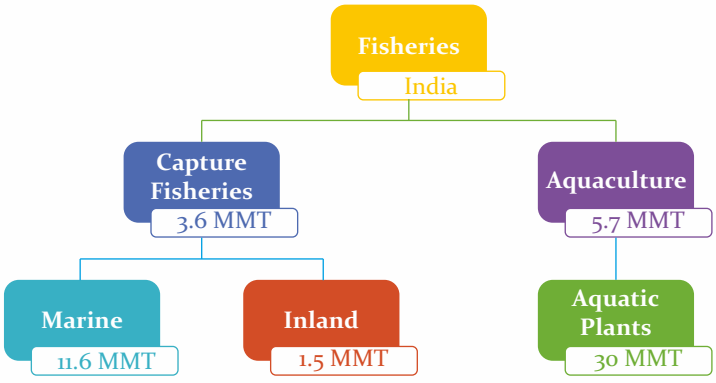
Fishing has always been an essential tool in the global efforts for ensuring food security. Global per capita fish consumption went up from meagre 9 kgs in 1961 to over 20 kgs in 2015, accounting for about 17% of animal protein consumed by the world population. With the first sale value of over $360 billion, excluding substantial collateral activities relating to fisheries services, the sector provides livelihood to close to 300 million people.

According to the Food and Agriculture Organisation (FAO), the global fisheries production, both captured and aquaculture, has grown from less than 20 million tons in 1950 to over 171 million metric tons (MMT) in 2016. With the marine catch in the slow growth lane since the mid-eighties, the growth has been largely contributed by aquaculture reaching an overall production share of 47% (80 MMT) and the balance 53% (91 MMT) coming from the capture stock. Inland capture contributed nearly 13% (11.6 MMT) to the gross production. Aquaculture also produces around 30 MMT aquatic plants.

China is by far the largest producer of captured fish, leading with an yield of over 15 MMT (2016), followed by Indonesia (6.1 MMT), USA (4.9 MMT), Russian Federation (4.5 MMT), Peru (4.6 MMT) and India (3.6 MMT). Performance of captured fish sector is dominated by 25 major coastal states accounting for over 80% of the total catch.[60]

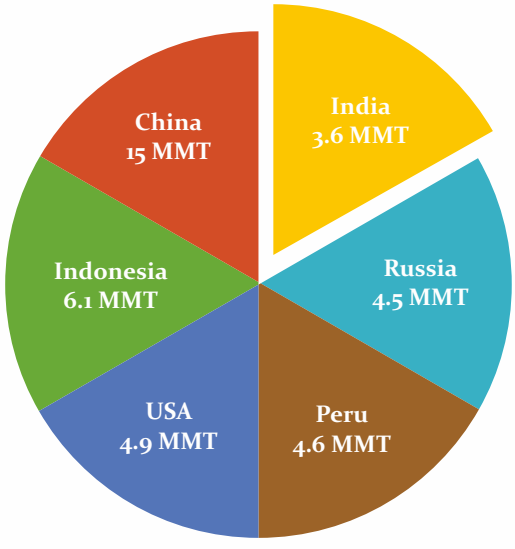
[60] *The State of World Fisheries and Aquaculture 2018; Food and Agriculture Organization of the United Nations- http://www.fao.org/3/i9540en/i9540en.pdf*

Figure 1



Source: Compiled by FICCI from "The State of World Fisheries and Aquaculture 2018"

Figure 2: Top Producers of Captured Fisheries 2016



Source: Compiled by FICCI from " The State of World Fisheries and Aquaculture 2018"

Asia is the leader in aquaculture with a global production share of close to 90%. Top five producers are Asian countries: China (49 MMT) again is by far the largest producer with over 60% of the global aquaculture production share, followed by India (5.7 MMT), Indonesia (4.9 MMT), Vietnam (3.6 MMT) and Bangladesh (2.2 MMT).[61]

[61] *Ibid*

Even in the inland capture, Asia leads. In the total global production of 11.6 MMT in 2016, China leads (2.3 MMT), followed by India (1.5 MMT), Bangladesh (1 MMT), Myanmar (0.8 MMT), Cambodia (0.5 MMT) and Indonesia (0.4 MMT).[62]

According to the 2016 data, a total of 30 MMT of seaweeds were farmed globally and China (14.4 MMT) leads, followed by Indonesia (11.6 MMT), the Philippines (1.4 MMT) and Republic of Korea (1.3 MMT).

Fish and sea food are amongst the most widely traded commodities. As per 2016 estimates, the total global fish exports were recorded at $142 billion. China ($20 billion) led the market, followed by Norway ($11 billion), Vietnam ($7 billion), Thailand ($6 billion) and USA ($6 billion) and India ($5.5 billion).[63]

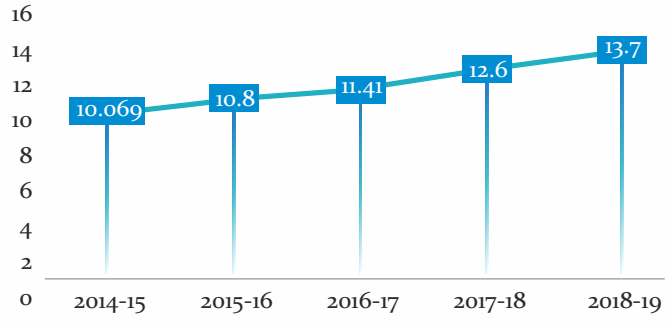
The year 2016 recorded total global imports of $135 billion. Major importing countries were USA ($20.5 billion), followed by Japan ($14 billion), China ($9 billion), Spain ($7 billion) and France ($6 billion). India has traditionally not been a significant importer.[64]

As per the FAO projections for 2030, the total fish production is expected to reach 201 MMT, entailing a cumulative growth of 18% and an additional production of 30 MMT, which will open significant new opportunities. However, the new opportunities would also demand greater emphasis on sustainability. Considering that the captured fish will grow only at about 1% annually reaching a total of about 91 MMT, much of the demand growth will need to be met through enhanced aquaculture yield expected to be around 109 MMT.[65]

Fishing is a major activity in India, and fishing industry has grown rapidly in recent times. In addition to India's vast coastline and islands, there are several fishing villages and many with floating population almost entirely dependent on fish for their livelihood. Artisanal fishing requires more encouragement and support. Fisheries sector is a major industry in India, especially in its coastal states, employing over 14 million people. Furthermore, India's fresh water resources consist of 195,210 kms (121,300 mi) of rivers and canals, 2.9 million hectares of minor and major reservoirs, 2.4 million hectares of ponds and lakes, and about 0.8 million hectares of flood plain wetlands and water bodies.

India is forecast to register a cumulative growth in fisheries of 24.6 % over 2016-2030 period, which is quite favourable compared to other major producers like China (18%), Indonesia (32%), Vietnam (26%) and Chile (45%). India's aquaculture is expected to grow at a phenomenal 44%.

Figure 3: Total Production of fish in India (in mmt)



Source: Compiled by FICCI from "National Fisheries Development Board, Department of Fisheries, Government of India"

[62] *Ibid*
[63] *Ibid*
[64] *Ibid*
[65] *Ibid*

Fisheries Statistics 2017-18

The Ministry of Fisheries, Animal Husbandry & Dairying has published a Handbook on Fisheries Statistics - 2018 according to which the Centre has allocated an investment budget of Rs. 25,000 Crores for the development of Fisheries in India in the next five years.

As per the Handbook on Fisheries Statistics- 2018, the Fisheries sector in India is a major source of livelihood. The data shows that for FY 2017-2018, the total fish production was 12.59 MMT where inland fisheries stood at a value of 8.90 MMT and Marine Capture at 3.69 MMT. The average growth in fish production stood at 10.14% as compared to 2016-17, which was 11.43 MMT, making India 2nd largest producer of fish on the world.

Source: Ministry of Fisheries released the Handbook on Fisheries Statistics (September 20, 2019)- https://www.fresherslive.com/current-affairs/articles/ministry-of-fisheries-released-the-handbook-on-fisheries-statistics-21789

With a coastline of 7516 kms,[66] EEZ of a little over 2.3 million km2, additional continental shelf of close to a million km2, rivers and canals of close to 200,000 kms, reservoirs of 2.9 million hectares, ponds and tanks of 2.43 million hectares, flood plains of 80 million hectares and brackish waters of one million hectares, India has significant opportunities for capturing the projected market expansion.[67]

Some of the key areas of sustainable growth would be as under for Indian industry to position itself for optimising gains.

Market expansion: By 2030, the demand-supply gap is expected to be about 30 MMT and a large part of this would be met through enhanced aquaculture production. Given China's planned capacity restraint till 2020 and greater emphasis on qualitative rather than the quantitative approach, India, with its proven capacity and experience, could plan timely expansion for filling the gap.

Promote high-value species in aquaculture: Purely quantitative approach has its own adverse impact on sustainability in the long run. It is, therefore, important to plan for a timely transition to high-value culture and catch.

Sustainable aquaculture practices: Aquaculture is a more reliable tool for expanding capacities and regulating species mix. However, there is a serious downside of unsustainable practices by way of nutrient/antibiotics/pesticide pollution, disease outbreak, gene pool contamination by escaping non-native species. For nutrient pollution mitigation, the industry needs to work on new feed mixes using phytoplankton to avoid excessive dependence on fish meal. There are success stories of "multi-trophic aquaculture" for reducing pollution and promoting recycling of harmful waste and they need to be replicated.

[66] *Please see https://ndma.gov.in/en/vulnerability-profile.html*

[67] *Please see http://www.mospi.gov.in/sites/default/files/reports_and_publication/statistical_publication/EnviStats/EnviStats_India_27sep18.pdf*

Shrimp - The Lead Aquaculture Product

It has been reported that shrimp production through aquaculture has been increasing consistently over the last 8 years. Shrimp aquaculture production, mainly comprising two species of shrimps (Penaeus monodon commonly known as giant or Asian tiger shrimp, and Litopenaeus vannamei commonly known as Whiteleg shrimp) and one species of freshwater prawn (Macrobrachium rosenbergii, known as giant river prawn or giant freshwater prawn) had reached over half a million MMT during the year 2015-16, mainly from the ponds of West Bengal, Odisha, Maharashtra, Gujarat and Andhra Pradesh.

High rejection rate: Indian exports of sea food face high incidence of rejection on account of presence of antibiotics and pathogens (Salmonella). On many occasions, these exports face outright bans causing massive losses. Greater care and closer monitoring/inspection, coupled with biological disease control could mitigate rejection

Shrimp Exports

In 2016-17, India exported 11,34,948 metric tonnes of seafood worth US$ 5.78 billion (?37,870.90 crore), frozen shrimp being the major item of export. According to the annual report of the Marine Products Exports Development Authority MPEDA 2015-16, shrimp constitutes 66% value of total exports. Frozen shrimp is a major item of export in terms of quantity and value. USA is the largest market for frozen shrimp, followed by European Union, Japan, Middle-East and China.

New technologies: New technologies are going to impact fisheries at every stage of the supply chains from catch to plate. New net systems are being developed for pre-extraction selection of target catch so as to minimise by-catch. Technology induction could help improve the sanitation at the landing stations, hygienic processing and packaging, adequate refrigerated storage and cold supply chains. These operational steps coupled with better regulation could help reduce wastage and rejection a great deal. At present, globally, one-third of the fish goes waste. In addition to these incremental measures, India with its proven capabilities in the ICT and space applications could also take advantage of the following disruptive technologies.

Big data applications: Collation of remote sensing, Automatic Identification System (AIS), GPS, and real time ground data could help improve fishing domain awareness by way of weather, currents, fish stock movement, spawning activity, illegal/unauthorised fishing, real time market demand/prices, which could bring extraordinary efficiencies in the sector. This domain knowledge could also help in promoting and strengthening Marine Spatial Planning (MSP). This technological capability of India will also have a lot of marketing and collaborative scope with international partners, especially the Indian Ocean region.

Application of blockchains: With growing awareness and concern about hygiene and sustainability, there would be greater demands on accountability of stakeholders through the entire supply chain, which could well be addressed through application of domain-linked blockchain system. India's ICT capability could be an advantage for developing and managing appropriate systems.

The National Policy on Marine Fisheries 2017 is aimed at preserving marine life and ocean health in India's EEZ, through sustainable harvest, is based on seven pillars, namely sustainable development, socio-economic upliftment of fishers, principle of subsidiarity, partnership, inter-generational equity, gender justice and precautionary approach. While the gist of the policy's vision is to maintain a healthy fisheries sector which would cater to the needs of the present and future generations, its mission is to ensure sustainability of the resources where the policy framework is in sync with the national, social and economic goals, livelihood sustainability and socio-economic upliftment of the fishing community.

A few recommendations with action plans, lined up under the NPMF 2017, are:

1. The Government will consider the suggestions to address the issues of overcapacity, given by the WG set up by the Government in 2011 for assessment of fish stocks in the Indian EEZ indicated overcapacity in territorial waters
2. The Government will lay emphasis on maintaining the harvest at about the current levels of Maximum Sustainable Yield (MSY), in the inshore waters
3. The Government will also undertake review and periodic evaluation of the existing marine protected areas (MPAs) and to make sure that the livelihoods of the traditional fishermen is not affected by the conservation measures
4. The Government will take appropriate steps in consultation with concerned scientific institutions and fishers in optimizing fishing effort and implementing measures that will help in sustaining the resources
5. A single window approach integrating all the stakeholders will be adopted to enable capacity building of the Indian fishing fleet for deep sea fishing along with entrepreneurship development, private investment, Public Private Partnership (PPP) and better leveraging of institutional finance for marine fisheries sector
6. Modalities will be worked out for integration of sea food processing and export sector with the deep-sea fishing industry for overall development
7. The Government will implement a National Marine Fisheries Data Acquisition Plan, involving Central and state governments, research institutions and stakeholders to acquire proper data and create management system for fisheries
8. In terms of mariculture, schemes to set up mariculture farms/parks and setting up of hatcheries for supply of seed, will be done along with taking care of the institutional and commercial needs
9. The Government will implement dedicated programmes for sustainable harvest of fisheries resources, mariculture, developing capacities of local fishers and institute post-harvest support that can allow the harvested resources to come to the mainland markets as also to seafood export destinations
10. Certain other recommendations regarding post-harvest processing, marine environment and pollution, climate change, Fisher Welfare, Social Security Nets & Institutional Credit, Gender Equity, Additional/Alternate Livelihoods and so on.

The Government has also focussed on 'Blue Revolution' (Neeli Kranti) by sustainable utilization of fisheries and protection of livelihoods of fishers, which will encompass the 'Blue Growth Initiative', to address the issues such as competing demands for ocean space, the need for Marine Spatial Planning

(MSP), demand for mineral and oil exploration/extraction from the seas, the increasing volumes of maritime commercial traffic and reservation of spaces for strategic defence purposes. The government, as per this policy, will engage in international as well as regional cooperation to showcase India's capability in managing its marine resources.

The way forward, as prescribed in the NPMF 2017, there will be 'Implementation Plan' to carry out the action points mentioned in the recommendations. It would also have a 'Monitoring and Evaluation' section that will address the timeliness and efficacy of implementation, which would lead to a sustainable and organised marine fisheries sector in India, ensuring enhanced utilization of the harvest for human consumption; employment, gender equity and livelihoods; equity and equality; provision of food security and nutrition; and creation of wealth and prosperity in the sector.

Source: The National Policy on Marine Fisheries 2017, Government of India

http://dadf.gov.in/sites/default/files/National%20Policy%200n%20Marine%20Fisheries%202017_0.pdf

The importance of maritime infrastructure for trade and development is best illustrated by the fact that nearly 80% of global trade by volume, and over 70% by value, is transported on board ships and handled by seaports worldwide. Ships, ports and the associated infrastructure are important components of the Blue Economy. These form a complex eco-system that connects the production hubs in the heartland to the seas.

It is generally agreed that modern ports and sophisticated cargo-handling facilities are critical to ensure that world seaborne trade grows at sustained levels. Also, there have been impressive technological advancements in shipbuilding: large size ships are being put into operations, new shipping routes have emerged, and there is growing concentration in shipping activity which necessitates state-of-the-art maritime infrastructure. Closely related is the issue of marine-related ancillary support services. Expansion in the maritime infrastructure sector filters down to the supporting industries which supply equipment and services to ship owners, shipping companies, shipyards and offshore rigs and platforms.

The Review of Maritime Transport 2017, an annual publication of the United Nations Conference on Trade and Development (UNCTAD), notes that world seaborne trade is forecast to grow at an estimated 3.8% compound annual growth rate (CAGR) between 2018 and 2023, contingent on continued favourable trends in the global economy.[68] In 2017 there was improvement in world fleet and a total of 42 million gross tons were added to global tonnage that corresponds to 3.3% growth rate. Likewise, in 2017, global port activity and cargo handling expanded: the top 20 global ports handled 9.3 billion tons, up from 8.9 billion tons in 2016. Further, UNCTAD estimates that 752.2 million TEUs were handled at container ports worldwide in 2017.

6.2 Port and Shipping: Port, Shipping, Ship-building

Ports

The Indian Government has an integrated maritime development programme called Sagarmala Programme which is central to the government's maritime vision. It was announced in 2015 and aims to turn

[68] *Review of Maritime Transport 2018, United Nations Conference on Trade and Development (UNCTAD), p.1. https://unctad.org/en/PublicationsLibrary/rmt2018_en.pdf*

the coastal areas into economic centers for regional and global maritime connectivity for trade to achieve the broad objective of promoting port-led development in India. The Sagarmala Programme has over 300 projects.[69] The key areas of the Programme are:

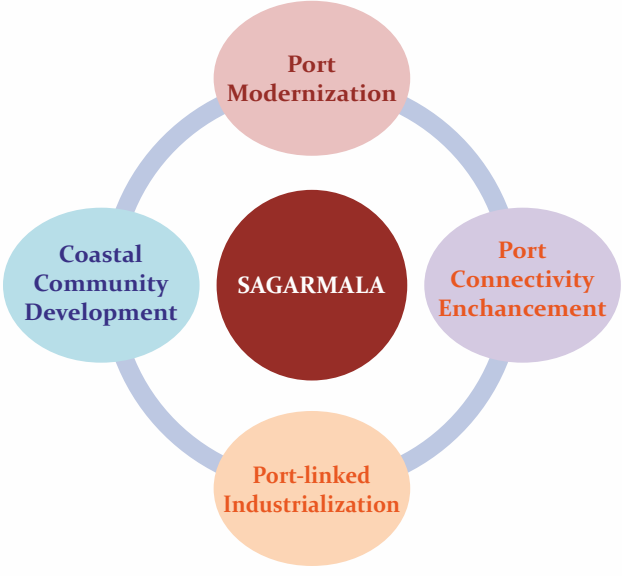
(a) Port Modernization and New Port Development including new greenfield ports;

(b) Port Connectivity Enhancement with the hinterland to optimize cost and time of cargo movement through multi-modal logistics solutions, including inland water transport and coastal shipping;

(c) Port-linked Industrialization and development of Coastal Economic Zones and industrial clusters to reduce logistics cost and time in international and domestic seaborne trade;

(d) Coastal Community Development promoting sustainable development of coastal communities through skill development & livelihood generation activities, fisheries development, coastal tourism etc.

Figure 4

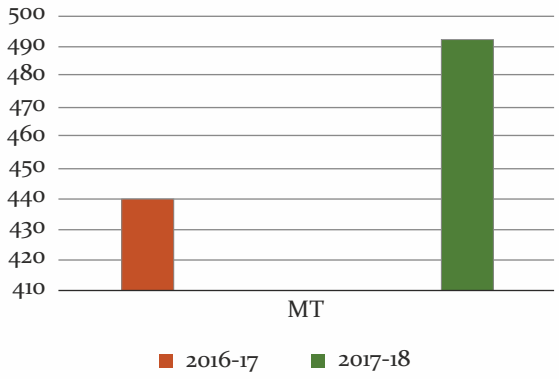


Source: Compiled by FICCI from "Sagarmala; Ministry of Shipping, Government of India"

During 2016-17, major ports in India handled 439.66 million tons (MT) of cargo[70] which increased to 679.36 MT in 2017-18. Cargo traffic at non-major ports was estimated at 491.95 million tonnes during 2017-18 and grew at 9.2 % CAGR during the above period.[71] The capacity of major ports in India during 2017-18 was pegged at 1,452 million tonnes and the Maritime Agenda 2010-20 has set a target of 3,130 MT of port capacity.

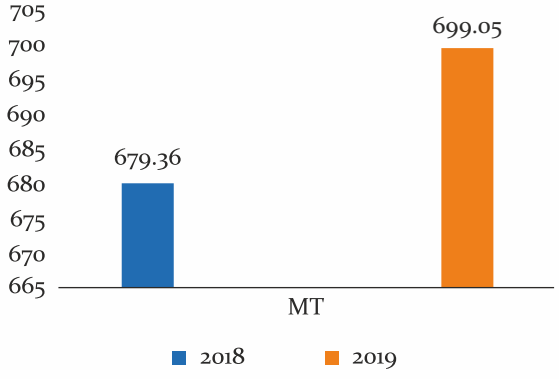
[69] *Guidelines for fundlng under Sagarmala programme- http://sagarmala.gov.in/sites/default/files/Guidelines_for_funding_under_SM_0.pdf*
[70] *Ministry of Shipping 2017- Year of Consolidation (DEC 20, 2017)- http://pib.nic.in/PressReleaseIframePage.aspx?PRID=1513281*
[71] *Indian Ports Industry Report- (July 2019)- https://www.ibef.org/industry/ports-india-shipping.aspx*

Figure 5: Cargo Traffic at non-major Ports in India



Source: Compiled by FICCI from "Shipping Industry & Ports in India, India Brand Equity Foundation (IBEF)"

Figure 6: Cargo Traffic at major Ports in India



Source: Compiled by FICCI from "Shipping Industry & Ports in India, India Brand Equity Foundation (IBEF)"

Under Sagarmala, 142 Port Projects have been identified and an investment of around $13.23 billion for capacity enhancement will be ensured over the next 10-15 years. The capacity addition at ports is expected to grow at a CAGR of 5-6 % till 2022, thereby adding 275-325 MT of capacity. Within the ports sector, investment of $10 billion has been identified and will be awarded over the coming five years. According to a report of the National Transport Development Policy Committee, cargo traffic is expected to touch 1,695 million MMT by 2021-22.

Expansion of export target would require greater port capacity. The Indian Government has set a target of 5% share in world exports for which exports would have to grow at an average annual rate of over 26% for the next five years. This would require, among other issues, infrastructure for trade such as ports.[72]

[72] *Dun & Bradstreet releases 'Port Logistics: Issues & Challenges in India' report; Ministry of Commerce & Industry (FEB 12, 2018)- http://pib.nic.in/PressReleaseIframePage.aspx?PRID=1520359*

Major issues causing detention and demurrage are: port congestion; customs clearance (including scanning & ICEGATE); shipping line issues and charges; documentation and paperwork; and regulatory clearance.

Private Sector Participation: Under the Sagarmala Programme, the Government has envisioned a total of 189 projects for modernisation of ports involving an investment of $22 billion by the year 2035. The Ministry of Shipping has set a target capacity of over 3,130 MMT by 2020, which would be driven by participation from the private sector. Non-major ports are expected to generate over 50% of this capacity.

Shipping

The Indian shipping industry may be divided into four distinct categories, that is, overseas shipping, coastal shipping, offshore support fleet, and inland transport. The overseas shipping caries cargo to foreign ports, the coastal component moves cargo among Indian ports, while the offshore fleet ferries men and material to offshore oil installations, and the inland water transport is for rivers and artificial infrastructures such as canals.

There are 1719 vessels under Indian register which corresponds to a miniscule 1.83% of the world's total. In 2017, 1011 vessels were engaged in India's sea borne trade; 885 vessels were under the National Flag and 126 foreign flagged vessels.[73] Further, India flagged ships constitute a large share in coastal traffic. It may be mentioned that no Indian shipping company is listed among the top 30 global liner companies.[74]

Cabotage Rule: In India, under the Cabotage rule, only Indian-registered ships carrying cargo can ply on local routes. Under section 406 of the Merchant Shipping Act 1958, the Government of India has relaxed the licensing requirement for ships chartered by Indian entities to allow coastal movement of agri-horticultural commodities, fisheries, animal produce and fertilisers. This would favour farmers to access a larger market profitably and promote trade and ease of doing business in India.[75]

Operational Efficiency: Several initiatives such as mechanisation, deepening the draft and speedy evacuations would help in improving operational efficiency.

Inland Waterways

The Indian Inland Water Transport (IWT) network comprises approximately 14,500 kms of navigable waterways (10,000 kms of rivers and more than 4,000 kms in canals). Despite water transport being cheaper, its share in the total transportation scenario of the country is only 7% in the case of coastal shipping, and 0.17% for Inland Water Transport (IWT). The revival plan of IWT includes increasing the coverage of national waterways and provision of necessary infrastructure for shipping and navigation, and adding to the IWT fleet.

An Integrated National Waterways Transportation Grid (INTG) Study was undertaken by IWAI through RITES with the aim to link the national waterways to national/State highways, railways (wherever feasible) and sea ports (wherever feasible) so that the waterways become an integral part of the total transportation grid. A sum of $3.3 billion has been allocated for the project to include developing and building fairway, terminals, ports, road and rail connectivity. The public investment is expected to attract private investment

[73] *Review of maritime Transport; UNCTAD (2018) https://unctad.org/en/PublicationsLibrary/rmt2018_en.pdf*
[74] *Ibid https://unctad.org/en/PublicationsLibrary/rmt2018_en.pdf p. 32.*
[75] *Sagarmala, Ministry of Shipping website- http://sagarmala.gov.in/cabotage*

of about $9.5 billion on inland shipbuilding, ship repair and cargo movement in the IWT Sector by the end of the 13th Plan, that is, by 2023.[76]

The government has also encouraged joint venture in the IWT sector, which can be executed as a Build, Operate and Transfer (BOT) project. A National Inland Navigation Institute (NINI) was set up at Patna. Since 2004 the institute conducts training courses in IWT, hydrography, river engineering, river terminal development, and transport economics. Notwithstanding these initiatives, the growth in IWT has been very slow compared to the road transport system. It suffers from several problems such as high silting of rivers, shallow depths during summers, poor dredging, and narrow width of rivers and poor navigation aids due to bank erosion. The Central government has encouraged states to optimally utilise the natural geography and build up the IWT sector. It has offered subsidy under the Vessel Building Subsidy Scheme payable to the entrepreneurs for construction of inland vessels built in India for operation in national waterways, Sunderbans and on the Indo-Bangladesh protocol routes.

Private Participation: IWT offers numerous opportunities for the private sector for creation of infrastructure and for fleet operations.

Shipbuilding

India has a long history of shipbuilding, but it constitutes a small percentage of the global shipbuilding market. As a result, nearly 90% of all Indian-owned and Indian flagged vessels are acquired from foreign shipyards. Besides, many public sector shipyards have not been able to compete with international shipyards in China, Japan and Korea due to the high cost of construction and irregular delivery schedules. However, over the past few years, India is emerging as an important shipbuilding nation, partly driven by forward-looking government policies. These have created favourable conditions for foreign investment to modernise and augment the capacity of the public sector shipyards.

There are 28 shipyards in the country capable of building ocean-going and coastal vessels for use by the domestic and foreign shipping industry, as also warships for the Indian Navy and the Coast Guard. Among these, seven are public owned and managed by the Ministry of Defence and the Ministry of Surface Transport.[77] The largest, Cochin Shipyard Ltd., is capable of building ships up to 110,000 DWT and repairing vessels up to 125,000 DWT. There are plans to set up two shipyards of international class. The National Ship Design Research Centre is the backbone for design and research.

Other important features of Indian ship-building market are abundance of skilled and semi-skilled manpower, burgeoning technical support and a vibrant ancillary industrial base. Also, several private shipyards have made debut in the domestic shipbuilding market. ABG Shipyard, Pipavav Shipyard, and Bharati Shipyard are all ranked in the global Top 150.

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[76] *Integrated National Transportation Waterway Grid Study; Inland Waterways Authority Of India http://iwai.gov.in/showfile.php?lid=820*

[77] *The Ministry of Defence administers the (a) Mazgaon Dockyard Limited, Mumbai (MDL), (b) Garden Reach Shipbuilders and Engineers, Kolkata (GRSE) and (c) Goa Shipyard Limited, Goa (GSL). As of October 2008, the three shipyards had constructed 469 ships (MDL - 196 ships, GRSE- 91 ships, and GSL- 182 ships) have been built and 39 under construction. The Ministry of Surface Transport controls (a) Cochin Shipyard Limited, Kochi (CSL), (b) Hindustan Shipyard Limited, Vishakhapatnem (HSL), (c) Hooghly Dock & Port Engineers Limited, Kolkata, and (d) Rajabagan Dockyard Central Inland Water Transport Corporation, Kolkata. There are two shipyards that are under the control of the State governments of Gujarat and West Bengal (a) Alcock& Ashdown Co. Ltd., Gujarat and (b) Shalimar Works Ltd; Kolkata, West Bengal*

It is estimated that the Indian ship-building industry would grow at a CAGR of 30 % through 2020, achieving a total value of $22 billion.[78] This represents 4.6% of the global order book. Further, job opportunities within the Indian shipbuilding industry are projected to rise at 20%, with the potential of employing more than 171,000 people by s 2020. Besides, the 34 dry-docks for ship repairs in the public and private sectors add to business opportunities.

Opportunities: Indian shipbuilding industry is poised for growth offering many opportunities for various stakeholders. The annual requirement of nearly 200 vessels for IWT can potentially generate more tonnage and create more jobs. The Government of India also has an ongoing Ship-building Financial Assistance Policy for 10 years (2016-2026) to encourage domestic shipbuilding.

Private Sector: The private sector too has been able to carve out a modest share in the Indian shipbuilding market but cannot boast of large infrastructure to match that of the public sector.[79] The three privately owned shipyards are ABG Shipyard, Bharti Shipyard and the Larsen & Toubro.

Policies: New policies are in place for the industry to double its size to $2.89 billion by 2022. With infrastructure status awarded for cheaper loans, relaxed codes, and additional benefits, it may be possible to achieve that growth by the projected date.

New Technologies: Robotics in shipbuilding is increasing and helps improving efficiency and overcome inaccuracies including savings of time. These can be used for several other tasks such as welding, painting, and heavy lifting. According to some estimates, shipbuilding market will register a CAGR of more than 2% by 2023.

6.3 Marine and Coastal Tourism

Tourism is amongst the fastest growing sectors of global economy with multiple upstream and downstream benefits by way of infrastructure, transport, furniture & furnishing, food, capacity building and a host of other services. Tourism also generates a large number of quality jobs and promotes local development and growth opportunities. India, with its rich history, culture, ecological diversity, long coastline, numerous islands and nearly all climatic zones, has seen significant sectoral growth and has immense scope to emerge as a global leader, subject to the nation's ability to develop efficient, clean, safe and competitive facilities with quality skills and sustainability.

In its latest report, the United Nations World Tourism Organization (UNWTO) has estimated the contribution of travel, tourism and related sectors to global GDP at over 11%, amounting to over $8 trillion. The sector also supported over 313 million jobs, almost 10% of total global jobs. The number of global tourists has risen from a meagre 25 million in 1950 to a staggering 1.2 billion in 2016. This is expected to swell to 1.8 billion by 2030.

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[78] "20 Indian Shipbuilding Industry Statistics, Trends & Analysis"; Brandon Gaille (February 15, 2018)- https://brandongaille.com/20-indian-shipbuilding-industry-statistics-trends-analysis/

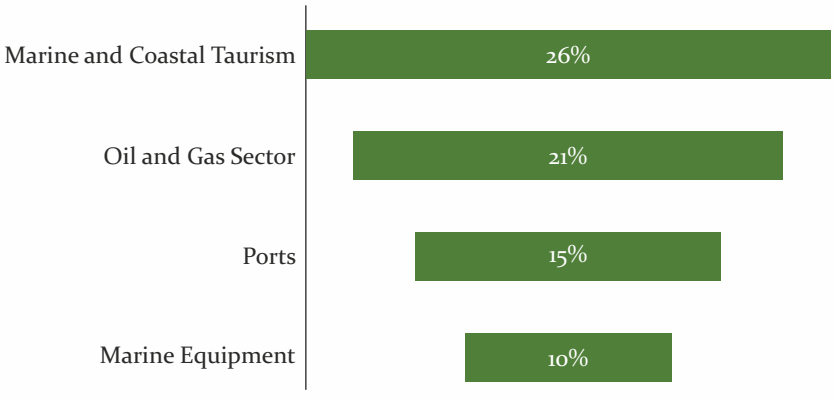
[79] Currently, there are 19 shipyards in the private sector, of various sizes and capable of building small to medium vessels including fishing craft. The larger of these are (a) ABG Shipyard and (b) Bharti Shipyard and © L&T

The sector is expected to continue robust growth in the coming decade and its total contribution to GDP is likely to reach 11.7% with an estimated value of $12.5 trillion by 2028. In the same period, the jobs supported by the sector would also grow to over 413 million, with a share of 11.6% of the global job market.

UNWTO (2018) estimates the value of travel, tourism and related up and down stream sectors in India at $236 billion (9.4% of GDP). This share is expected to expand to $463 billion (9.9% of GDP) by 2028. As regards employment, travel, tourism and related sectors supported over 26 million jobs (5.1%), and this number is expected to grow to over 33 million. International tourist arrivals are forecast to grow from 18.6 million (2017) to over 30 million by 2028. The sector also attracted estimated capital investment of around $39 billion in 2018, which is expected to grow to $80 billion in 2028. Tourism spending is led by domestic tourists at 87% of the total. Similarly, majority spending on travel is driven by leisure (94.6%).

According to an OECD report, marine and coastal tourism will become the largest component of the overall ocean economy by 2030, exceeding the off shore oil and gas sector. The contribution of marine and coastal tourism in the overall Blue Economy will be 26%, followed by oil and gas sector (21%), ports (15%), marine equipment (10%) and other segments.[80]

Figure 7: Ocean Economy (OECD Report 2030)



Source: Compiled by FICCI from "OECD Report 2030"

India has accorded high priority to further develop and promote tourism - both domestic and international, including marine and coastal tourism. In the coastal tourism sector, some of the important initiatives include: promoting cruise tourism by developing special port facilities at Mumbai, Goa, Cochin, and Chennai for both domestic and international cruises.[81] By 2030, Indian cruise segment is expected to attract 1.2 million tourists.

[80] *Workshop on Maritime Clusters and Global Challenges- 50th Anniversary of the WP6 (December 1, 2016)- The Ocean Economy in 2030 https://www.oecd.org/sti/ind/Session%201_b%20-%20Claire%20Jolly%20-%20Web.pdf*

[81] *Also refer to "India Inbound Tourism Unlocking the Opportunity" (April 2019) by FICCI- http://ficci.in/spdocument/23082/India-Inbound-Tourism-Knowledge-Paper-ficci.pdf*

Another important initative is to develop light house tourism, taking advantage of 189 light-houses located both on mainland and islands. Finally, the government is also planning to develop a range of ecotourism projects at Andaman-Nicobar and Lakshadweep islands. coastal states are also paying increasing attention to developing beach and marine tourism by improving overall infrastructure ranging from hotels, hygiene, safety to connectivity. These initiatives will bring huge business opportunities in the public private partnership mode.

Within a decade, India should prepare for servicing a total of close to 33 million international and many more domestic tourists. With the spending power growing, these tourists would demand better facilities and would be willing to pay more. This would entail more capacity in 3 and 4 star accommodation, preferably with reliable brand franchises, standard restaurants with a wider variety of cuisines, better connectivity, hygiene and safety. These improvements would be more urgent for marine and coastal tourism which is much more quality sensitive.

Marine Leisure Industry

Marine leisure and recreational industry is one of the thrust areas in the national plan to develop the Blue Economy. The sector has numerous segments such as water sports, recreational fishing, island visits, and many more. Therefore, it is a multi-specialty industry and has enormous potential for investments and job opportunities. In this sector, Yachting is for pleasure and recreational purposes, and is an important segment of the marine leisure industry. Yacht can be as small as 10 meters and Super Yachts are large enough to be classified as mini cruise ships. The latter are sea-going and often seen in the oceans and seas across the globe.

Yachting industry and the related infrastructure require a variety of specialists such as naval architect for designing Yachts, boat builders and engineers, yacht surveyors, yacht brokers, water sports manager and instructors. Likewise, marinas and yacht harbours require specialists to perform duties as managers, dock masters etc. Besides, there are crew requirements for super yachts which normally have a crew of 10 or more.

Currently, the Kochi International Marina in the state of Kerala is the only marina in India.[82] Luxury yachts sailing through the Indian Ocean call at Kochi; it is the world's only marina with an adjacent golf course. Another marina capable to berth 26 yachts is under consideration by the State Government and is expected to come up at Thalassery, located between Kochi and Goa. The Maharashtra Maritime Board is also developing a marina under the public-private partnership model in Belapur; its facilities would include 30 berths.[83] By some estimates, in 2013, there were over 1,000 leisure boats of all sizes in India and nearly 60% were in Mumbai. Of these, 300 or so, ranging from small sailing dinghies to 30-meter long power yachts could be seen off the Gateway in India in the south of the city.[84]

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[82] *"Feasibility report on Development of Marina at Thalassery", http://www.keralaports.gov.in/doc/Marina%20at%20Thalassery.pdf*

[83] *"Mumbai Marina in the News", https://indiayachtpage.com/2018/04/03/mumbai-marina-in-the-news/ (accessed 7 January 2019). It will have boat storage, boat repair facility, a boat launch facility, water treatment plant, walkway bridge, waste management and battery recharge facilities. Ocean Blue is one of India's largest boating companies and their marina project is expected to be operational by May 2018*

[84] *"Mike Derrett's IBI India Article: Indian Boating - Leaking, But Not Sinking!", https://indiayachtpage.com/2013/11/15/mike-derretts-ibi-india-article-indian-boating-leaking-but-not-sinking/ (accessed 7 January 2019)*

The annual India Yachting Festival is also an opportunity for the display of marine leisure industry products, sports and lifestyle brands. It offers a unique opportunity to showcase them to the affluent categories of people.

The global yacht charter market was $8.1 billion in 2016 and is estimated to expand at 7.2% CAGR between 2017 and 2025. It is projected to generate $15 billion by 2025. Barring a few investments referred above, the Yacht and Marina market in India is yet to start working towards its true potential.

Although the ownership and use of luxury yachts in India is not quite popular, and only about 500 registered leisure boats are berthed in existing port facilities. Setting up of marinas can be a major growth factor for building yachts, encouraging ownership of luxury boats, generating revenue for ports and creating jobs.

China offers a good model for the development of marinas that now attract international and national tourists. Sanya, Qingdao and Xiamen are home to the growing yacht and luxury boating industry and a number of international manufacturers of marina equipment from around the world are setting up operations to take advantage of a new market. For instance, the Wuyuan Bay Marina in Xiamen is experiencing inflow of capital for development of yachting and tourism. The marina will include berths for 600 boats; house a yacht club and business centre, and host exhibitions and regattas. China declared 2013 asb the 'Year of Marine Tourism' with the theme 'Beautiful China'. The associated slogans were 'Experience the Sea, Tour China', 'Marine Tourism Shapes the Future' and 'Marine Tourism, Unlimited Excitement'.

6.4 Offshore: Renewable Energy- Wind, Wave, Tide; and Desalination

India has sovereign rights for the production of energy from water, currents and winds in its EEZ.

Electricity generation from renewable sources is becoming increasingly popular and is graded as clean. Investment in this sector has been impressive worldwide and doubled in 2016 as compared to new fossil fuel energy generation sources that been under scrutiny in terms of pollution and environmental degradation. According to market sources, the capacities in wind, marine, solar, waste-to-energy, small geothermal and hydro sources, and biomass combined added up to 138.5 GW in 2016, up from 127.5 GW in 2015.[85]

The offshore segment of the renewable energy is through wind, wave, and tide. Offshore wind energy is obtained by using wind turbines on static platforms in the seas preferably along the coast line.. The Global Wind Power Market Outlook is quite positive. As of 2018, more than 680 GW of new wind power capacity was expected to come online globally over the next 10 years.[86]

The Earth System Science Organization (ESSO)- Indian National Center for Ocean Information Services (INCOIS)- NIOT (National Institute of Ocean Technology) have carried out preliminary offshore wind feasibility studies including commercial viability studies and identified the potential locations along Gujarat and Tamil Nadu coasts for the development of offshore wind farms.

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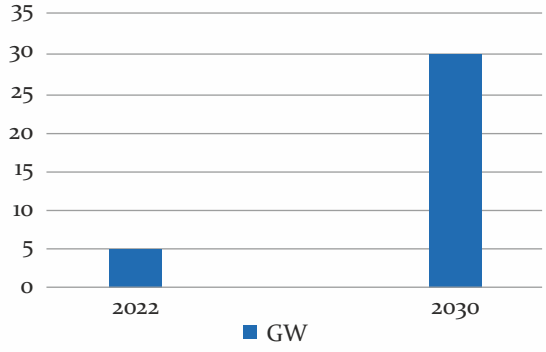
[85] *Wave and Tidal Energy Market Size Worth $3.9 Billion By 2025 (February 2018)- https://www.grandviewresearch.com/press-release/global-wave-tidal-energy-market*

[86] *"Report: More than 680 GW of new wind to come online over next decade" by Renewable Energy world (December 2018)- https://www.renewableenergyworld.com/articles/2018/12/report-more-than-680-gw-of-new-wind-to-come-online-over-next-decade.html*

The major challenge for offshore wind energy development is the need for specialized infrastructure, including suitable vessels, port facilities and maintenance facilities for off-shore wind farms. ESSO-NIOT have developed and demonstrated a range of floating wave powered systems.[87]

Figure 8: National targets for offshore wind capacity additions for India



Source: Compiled by FICCI from "Year End Review 2018- Press Information Bureau, Ministry of New and Renewable Energy, Government of India"

Tidal energy generates electricity on the principle of converting kinetic motion of the tides (high and low) by using large underwater turbines that are positioned in sea areas which experience high tidal ranges. The Gulf of Khambhat, Gulf of Kutch, Palk Bay, Gulf of Mannar, Sundarbans, and Andaman Islands are good examples.

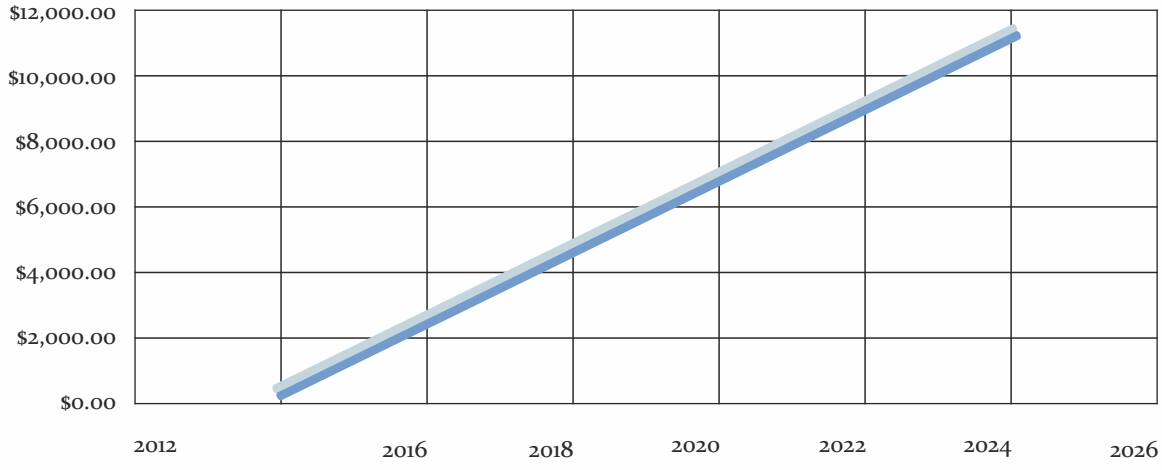
Similarly, wave energy is generated by ocean or sea waves and it is estimated that by improving technology and based on economies of scale, wave-based generators can be used to produce electricity at a cost comparable to wind-driven turbines. According to market estimates, wave and tidal energy market was valued at $487.7 million in 2014 and is anticipated to reach $11,365 million in 2024, expanding at a CAGR of 23% from 2016 to 2024.[88] Wave energy segment is likely to register significant growth in the coming years on account of extensive R&D and new project developments in numerous economies, including Ireland, Sweden, Portugal, U.S., China, and New Zealand.[89] The number of companies in the global wave and tidal energy market has registered an increase in the recent years; they are making significant efforts to advance their technologies and deploy novel and improved equipment.

[87] *For more technical information, National Institute of Ocean Technology (NIOT) at Chennai may be contacted*

[88] *"Wave and Tidal Energy Market to Touch US$ 10 Billion By 2022"; Market Watch (October 16, 2018) https://www.marketwatch.com/press-release/wave-and-tidal-energy-market-to-touch-us-10-billion-by-2022-2018-10-16*

[88] *Wave and Tidal Energy Market Size Worth $3.9 Billion By 2025 (February 2018)- https://www.grandviewresearch.com/press-release/global-wave-tidal-energy-market*

Figure 9 : Wave and Tidal Energy Market in millions



Source: Compiled by FICCI from "Wave and Tidal Energy Market Size, Share & Trends Analysis Report By Energy Type (Wave, Tidal), By Region (North America, Europe, Asia Pacific), Competitive Landscape, And Segment Forecasts, 2018 - 2025"

Ocean thermal energy and low temperature thermal desalination: Successful use of ocean thermal energy and desalination has been demonstrated by ESSO-NIOT in the Lakshadweep Islands. This is a growth area in the Indian context.

Desalination

Among the many development challenges facing India is availability of clean drinking water for its growing population that is expected to peak at 1.5 billion people by 2050. The rapid groundwater depletion, the decline in average rainfall, river water pollution due to poor industrial waste management practices, and varied human induced activities further add to the shortages and contamination.

The water resource situation has acquired critical importance and the vagaries of climate change would only add to water stress. A NITI Aayog report "Composite Water Management Index' (CWMI)'[90] has warned that nearly 70% of water is contaminated and India ranks at 120th position amongst 122 countries in the water quality index, which is very low. Furthermore, 21 Indian cities will experience water shortages by 2020 and nearly 600 million people could be under high-to-extreme water stress. Perhaps what is more worrying is the fact that if "mitigation measures are not implemented, India faces a 6% loss in its gross domestic product (GDP) by 2050."

[90] *Composite Water Resources Management: Performance of States; NITI Aayog (June 2018)- http://www.niti.gov.in/writereaddata/files/document_publication/2018-05-18-Water-index-Report_vS6B.pdf*

The seas are an important source of water, and desalination is a useful solution. There have been a few success stories of desalination in India (Chennai[91] and the Lakshadweep Islands[92]), but additional facilities are required to support coastal areas and other industrial hubs and corridors that would come up under the Sagarmala project.

Desalination in California

Desalination has been a success story in the State of California, United States, and Carlsbad Desalination Plant, a joint venture between a private developer Poseidon Water and the San Diego County Water Authority, delivered 40 billion gallons of drought-resilient drinking water to San Diego County during three years of commercial operations at the plant. The 30-year Water Purchase Agreement between Poseidon Water and the Water Authority is a major component of the State's multi-decade strategy to diversify water supply portfolio. Similarly, 'The Pipe' project is a good example of a sustainable infrastructure capable of generating 10,000 MWh annually which in turn produces 4.5 billion liters of drinking water for California.

Trends: Ocean energy is witnessing significant development in terms of new projects in various economies in Asia, Europe, Southeast Asia, East Asia, China, Canada, UK, and US, which would potentially drive the market in the future.

Costs: High cost and socio-economic and environmental factors are likely to restrain the development of the market over the forecast period.

The Way Ahead: Investment in R&D, new projects, and partnerships are some of the major strategies that are being adopted by companies in the industry.

6.5 Offshore Energy: Oil & Gas

India has 26 sedimentary basins, of which only seven have commercial production of oil and gas. Major offshore oil terminals located in the Arabian Sea and the Bay of Bengal are at:

(a) Bombay Offshore consists of Panna-Mukta Oilfield; Bassein Gas Field; Bombay High; and, Tapti Gas Field;

(b) Gujarat Oil Fields are Ankleswar, Cambay, Kalol, Kosamba, Mehsana, Nowgam, Dholka, Lunej, Sananda, Wavel Bakal and Kathana; and,

(c) KG Basin. The name of the Project is KG-DWN-98/1 or simply KG-D6.[93]

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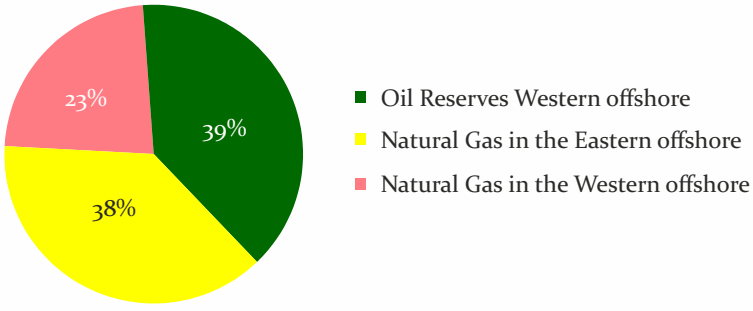
[91] *The population of Chennai Metropolitan Area is projected to exceed 15 million by 2035. Two desalination plants of 100,000 m^3/d capacity based on reverse osmosis (RO) Nemmelli plant built by a joint venture led by water technology firm, Wabag, already operate in Chennai, and a third 150,000 m3/d capacity out for tender. The fourth plant is expected to be of 400,000 m3/d capacity and Japan International Cooperation Agency (JICA) is to loan JPY 30 billion ($283 million) for the project which is scheduled to be completed by March 2025.*

[92] *National Institute of Ocean Technology (NIOT) under the Ministry of Earth Sciences is setting up the world's first self-powered desalination plant using the technology of ocean thermal energy conversion (OTEC) in Kavaratti Island in Lakshadweep. "World's first self-powered desalination plant by NIOT coming up in Lakshadweep", http://www.newindianexpress.com/nation/2018/oct/23/worlds-first-self-powered-desalination-plant-by-niot-coming-up-in-lakshadweep-1888841.html*

[93] *Quora (January 2015)- https://www.quora.com/What-are-names-of-oil-fields-in-India-Bombay-Offshore-Gujarat-KG-Basin-and-Barmer-region; https://www.quora.com/What-are-names-of-oil-fields-in-India-Bombay-Offshore-Gujarat-KG-Basin-and-Barmer-region*

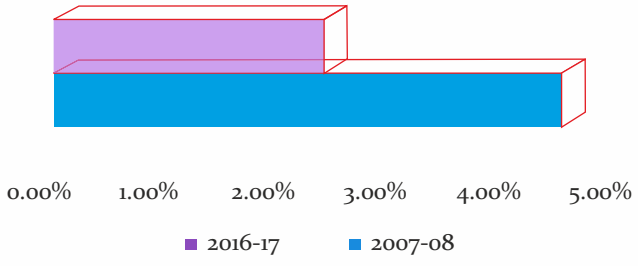
The Oil and Natural Gas Corporation (ONGC) has made a significant natural gas discovery in the Gulf of Kutch off the west coast of India and plans to start production in a few years.[94] In terms of distribution of oil and gas, maximum reserves of oil are in the Western Offshore (39.60 %) and Natural Gas are in the Eastern Offshore (39.37%), followed by Western offshore (23.44%).[95] India's energy consumption of Crude Oil and Natural Gas has been increasing over the last decade. During the period 2007-08 to 2016-17 the production increased by 0.54% and (-) 0.16%, whereas consumption increased by 4.63% and (-) 2.47%.[96]

Figure 10 : Distribution of Oil & Gas



Source: Compiled by FICCI from "Energy Statistics 2018, Central Statistics Office, Ministry of Statistics and Programme Implementation, Government of India"

Figure 11 : India's Energy Consumption



Source: Compiled by FICCI from "Energy Statistics 2018, Central Statistics Office, Ministry of Statistics and Programme Implementation, Government of India"

[94] *"ONGC to open India's 8th sedimentary basin with Kutch gas find", Press Trust of India, 10 January 2018.*

[95] *Energy Statistics; Central Statistics Office Ministry Of Statistics And Programme Implementation Government Of India (2018)- http://mospi.nic.in/sites/default/files/publication_reports/Energy_Statistics_2018.pdf*

[96] *Ibid*

Gas Hydrates:

Gas hydrates are a major source of future energy requirements. The Ministry of Earth Sciences, CSIR-NGRI and CSIR-NIO are involved in activities towards exploitation of gas hydrates. Current research by these institutions attempts to identify gas hydrate reservoirs, quantification and assessment of gas hydrates, identification of prospective zones in the Krishna-Godavari, Mahanadi and Andaman offshore basins.

ESSO-NIOT has developed exploration tools such as remotely operable vehicles (ROVs) and Wireline Autonomous Coring System (WACS).

It is also engaged in developing numerical models towards extraction of methane gas from gas hydrate reservoirs. Various models for thermal simulation, gas hydrate reservoir modelling, methane gas bubble dissolution model, etc. have been developed.[97]

6.6 Marine Biotechnology and Pharmaceuticals

Biotechnology refers to any technology, process or practice employed to modify or harness any living organism, product or system for human usage. Even though the term Biotechnology has been of a relatively recent coinage, human society has used such practices for ages, starting from the very domestication of food crops and cattle, their trait improvement through breeding and selection. Today, Biotechnology is one of the cutting edge futuristic fields of science, promising to alter the very genetic foundation of life for quantitative and qualitative modifications in the processes involving living organisms in the service of society. Applications could influence not only quality of life but offer completely new methods and processes for higher, more efficient and sustainable yields in agro-farming, aquaculture, pharmaceutical, new materials, renewable energy and waste disposal.

Identification, selection and operationalisation of desired genes is at the heart of Biotechnology. Larger gene pool makes it easier to find the desired genetic transcript for target applications. This is where the Marine Biotechnology opens unimaginable opportunities. Over 80% of earth's biota lives in the oceans spread over very diverse, extreme and testing geo-climatic conditions that induce special adaptations for fighting climatic extremes, predation and disease. Evolution of marine life under such conditions has led to the emergence of novel genes and secondary metabolites that could solve a variety of societal challenges in health care, food, energy, materials and manufacturing.

Advances in maritime domain awareness and access, analytical and extraction chemistry, and DNA sequencing have made it possible to trace, extract and identify medicinal substances as also novel genes for diverse applications. Principal sources of such bioactive substances have been sponges, molluscs, bryozoans, tunicates, coral, microbes (algae, bacteria, fungi, virus), some invertebrate and vertebrate species. These substances have applications in pharmaceuticals, cosmetics, food, biofuels, bio polymers, and aquaculture.[98]

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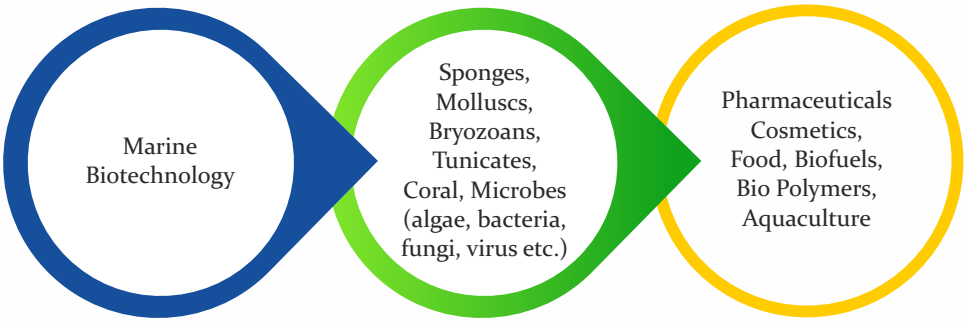
[97] *For more information National Institute for Ocean Technology at Chennai may be contacted.*

[98] *Marine Biotechnology Task Force Report; Marine Institute (2016)- https://www.marine.ie/Home/sites/default/files/MIFiles/Docs/ResearchFunding/MarineBiotechnology-TaskForceReport.pdf*

Figure 12 : Bioactive Substances and their Applications



Source: Compiled by FICCI from "Marine Biotechnology Task Force Report, Marine Institute (2016)"

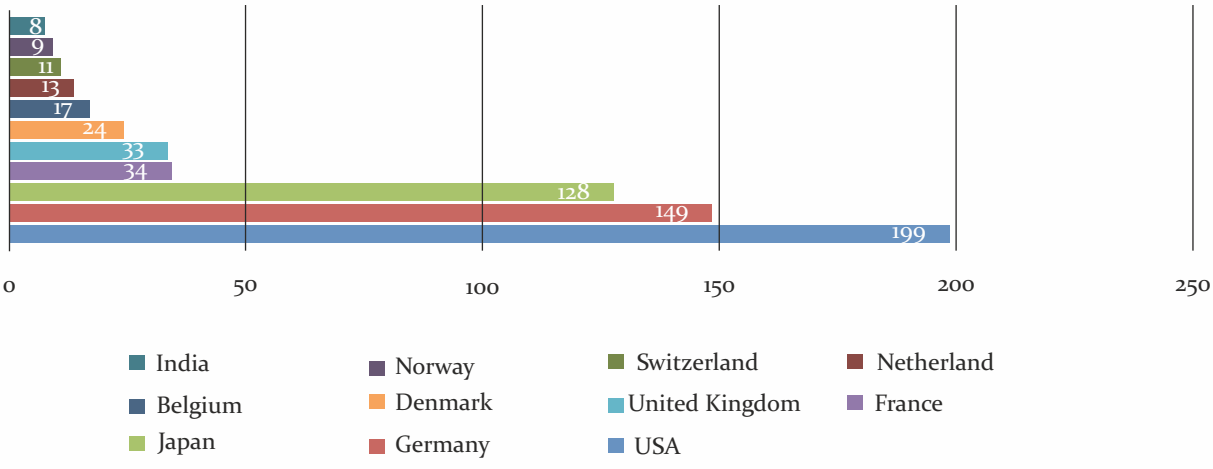
According to the latest research, 25,000 bio-active secondary metabolites have been extracted so far from marine sources. These are broadly alkaloids, sterols, poly-unsaturated fatty acids, enzymes, polysaccharide, pigments among others. Most of these compounds display medicinal properties like anti-tumour, anti-cancer, anti-angiogenesis, anti-proliferative, cytotoxic, photo-protective, anti-inflammatory, anti-oxidant, antibiotics anti-foulding and other useful properties.

As of 2017, seven marine metabolites were approved as drugs for sale in the US, EU and other countries. About 12 compounds were at different stages of clinical trials, whereas several others were at pre-trial stages. The main reason for slow transition from identification to clinical trials was non-availability of sufficient quantities of these substances. However, given their high value, industry will need to explore synthetic route to replicate these compounds in-vitro,where possible, to take advantage of this enormous opportunity.

Interest in marine genetic resources is also rapidly growing for potential applications. More and more marine genes are being identified, sequenced and patented. According to an article in Science Advances (2018), close to 13,000 genetic sequences, including genes, from close to 900 marine species have been processed for patent registrations. Most of these patents have been filed by advanced countries, mainly by their transnational enterprises. This shows growing global economic interest in marine genetic resources.[99]

[99] *Ibid*

Figure 13 : Top 10 International Claims of Marine Gene patents during 1991-2009



Source: Compiled by FICCI from "Prospects of Blue Economy in the Indian Ocean- RIS (Research and Information System for Developing Countries) (2015)"

Marine products have been used in cosmetics for ages and this industry is now using Biotechnology in developing high-end products. Micro algae, shell extracts, marine sediments are being extensively employed for anti-aging, anti-ultraviolet, dilating and anti-psoriasis creams, though more research needs to be carried out for establishing empirical treatment-result relationship for expanding this high end sector.

Use of algae for biofuels also has good potential. Yields from marine algae (biomass) are much higher than the terrestrial sources. However, much still needs to be done for effective transformation of this resource for up-scaling production for commercial viability.

The market evaluation for marine biotechnology is still in its infancy because of complexities of applications and non-availability of segregated data. Nonetheless, according to some estimates, the current market value for Marine Biotechnology should be a little over $4 billion, which is expected to grow close to $6 billion by 2022. Cosmetics and aquaculture applications would be growth drivers in the short run, whereas depending on successful approvals of medicinal metabolites, marine pharmaceuticals have the potential for rapid high value growth. Future growth could also come from new materials.[100]

India was among the early players to have paid attention to the development of Biotechnology by setting up a separate department in the seventies. The department is promoting and financing Biotechnology research and there have been some visible success stories in the Pharma industry, especially recombinant DNA based vaccines and serums. Protein-based drugs, especially enzymes, are good growth drivers. Significant growth opportunities are available in agri-farming sector.

At present, overall Biotechnology market in India is estimated at close to $11 billion and expanding fast. This capacity would also help to develop Marine Biotechnology. Efforts are already under way and there have been success stories in disease control in aquaculture. Significant opportunities for India in the Marine Biotechnology sector are briefly listed below.

[100] *Ibid*

Take lead in R&D: With India's proven capability and experience in the field of Biotechnology, having performed fairly well in Biotechnology based solutions in agriculture, animal husbandry and pharmaceuticals, India needs to pay enhanced attention to marine Biotechnology. Given the expensive nature of operations and limited short-term returns, these efforts will have to be led by the public sector, especially marine bio-prospecting and marine genetic resource mapping. So far, this field has been monopolised by the advanced countries; this may inflict heavy costs on the developing countries, which should be avoided.

Aquaculture, a low hanging fruit: As the global and Indian growth in fisheries in foreseeable future will be driven primarily by aquaculture, there is a need to explore Biotechnology applications for developing alternate feed as also disease monitoring and mitigation methods.

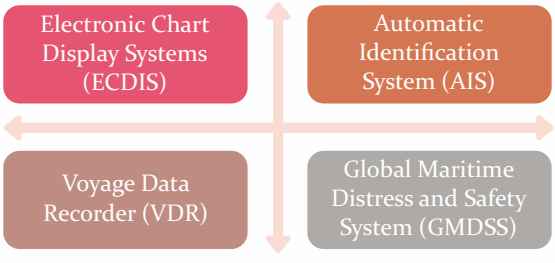
Marine pharmaceuticals: Having done so well in the Pharmaceuticals sector, Indian companies have the capacity to invest in extracting, analysing, testing and manufacturing marine metabolites. These compounds will be used mostly in high end medicinal treatments like cancer, tumours, drug resistant infections and extreme pain. It is essential that the country takes lead in this field where the public sector will have to be a major player, at least in the initial stages.

6.7 IT-Driven Marine Innovation

The marine and maritime sectors have witnessed rapid assimilation of information and communication technologies through increased digitalisation in all sectors. Systems automation, use of smart sensors, global networks for data transfer, unmanned and remote-controlled systems, and semi or fully autonomous operations are significant features of these sectors. Significantly, growing digitalization and the ever-expanding use of electronic data have transformed the way marine and maritime sectors operate.

A modern marine-maritime ecosystem is built around physical and cyber facilities and is referred to as Cyber-Physical System (CPS). This has been shaped by software systems, communications technology, and sensors/actuators including embedded technologies. CPS can include constituents from many agencies or service providers, who may sometimes be unaware that their products and services are integrated with others to create CPS of Systems. For instance, today a ship at sea uses Electronic Chart Display Systems (ECDIS), Automatic Identification System (AIS), radars as navigational tools, the onboard Voyage Data Recorder (VDR) to record and store data of each voyage in electronic format and Global Maritime Distress and Safety System (GMDSS).

Figure 14: Cyber-Physical System (CPS) Technology



Source: Compiled by FICCI

Inputs from these and other sensors such as machinery sensors and control systems are also available to other agencies, which may include port authorities, Stevedore service providers, repair and maintenance companies, customs agencies, health and quarantine authorities, shipping agents and supply chain managers. Likewise, different fields of knowledge and expertise can come together to jointly design a unique CPS which in the case of the marine-maritime ecosystem would enhance efficiency and productivity.

Industry 4.0

There is now increasing evidence that marine and maritime industries and businesses are harnessing Artificial Intelligence, Augmented Reality/Virtual Reality, Deep Machine Learning, Big Data, Blockchain technology, Internet of Things, Robot, Drones, digital twinning and 3D printing to harness the seas as also support offshore and shore based static and mobile marine-maritime infrastructure. These technologies are the frontrunners of a new revolution labeled as the Industry 4.0 (or 4 IR) which is currently underway.

3D Printing

Several shipyards have begun to use 3D printers which can potentially cut down costs, delivery time and increase efficiency. For instance, Innovation Quarters, Havenbedrijf Rotterdam, RDM Makerspace and AEGIR-Marine is a consortium of 27 marine related companies that have established a project called '3D Printing of Maritime Spare Parts'.

South Korea's Ministry of Trade, Industry and Energy has decided to invest $20 million over five years (2017-2022) to research into 3D printing and 3D manufacturing of ships and offshore equipment.

3D Scanning AS, a subsidiary of the Maritime Group of Norway has a partnership with 3Discovered of Chicago, a leading industrial 3D printing services platform, to supply 3D printed parts to its cruise/maritime ship repair and retrofit service business.

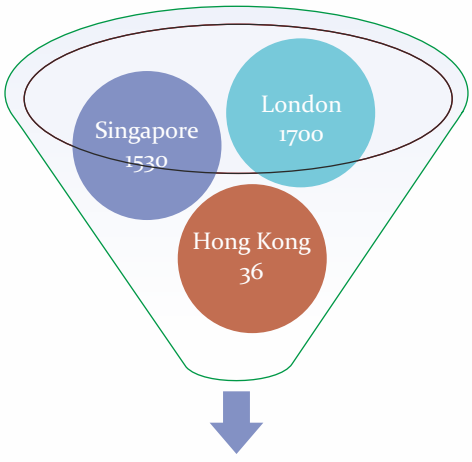
3D Matters in Singapore is a long-time established Additive Manufacturers entity and is helping clients enter and grow their 3D printing needs. Going by the current trends, 3D printing technology would be the future of marine and maritime ecosystem.

6.8 Insurance and Legal

Another critical supporting sector for the Blue Economy is Legal Services which includes marine insurance and marine dispute resolution. This sector provides the necessary legal support for all the industries that range from insuring ocean-bound vessels, offshore wind farms and energy assets, and dispute resolution through Alternative Dispute Resolution (ADR), including arbitration and mediation, which has become very popular and a dominant choice of resolution in the global shipping industry. For instance, in 2016, approximately 1700 individual maritime arbitrations were handled in London; Singapore saw less than 10% of London's maritime arbitration case load; Hong Kong dealt with approximately 36 maritime arbitrations; Dubai and Paris arbitration institutions put together hosted fewer than 20 maritime arbitrations in total in 2016.[101] Ironically, major Indian ADR cases are handled overseas.

[101] *The Maritime Arbitration Universe In Numbers: Will Brexit Impact London's Standing? HFW (March 2018)- http://www.hfw.com/The-maritime-arbitration-universe-in-numbers-will-Brexit-impact-Londons-standing-March-2018*

Figure 15



Source: Compiled by FICCI from "HFW Article "Shipping Insight: The Maritime Arbitration Universe In Numbers: Will Brexit Impact London's Standing?"(March 2018)"

6.9 Deep-sea Mining

Deep-sea mining is an important element in the concept of the Blue Economy as well as in the context of the Sustainable Development Goals.

The term "deep-sea mining" refers to exploration and exploitation of mineral resources lying in the seabed and ocean floor and subsoil thereof, beyond the limits of national jurisdictions (international area, referred to as "Area"[102]). These resources are found at depths ranging from 3000 to 6000 metres. Activities in the Area such as exploration and future exploitation of resources have to be carried out within the legal framework envisaged under the 1982 United Nations Convention on the Law of the Sea (referred to as Convention), read with the 1994 Agreement Relating to the Implementation of Part XI of the Convention. According to this legal framework, the Area and its resources are the "Common Heritage of Mankind". State Parties to the Convention organise and control activities in the Area and administer the resources through the International Seabed Authority (Authority). The Authority is an autonomous body established under the Convention with headquarters in Kingston, Jamaica.

Activities in the Area relating to exploration and exploitation of resources have to be conducted in terms of contracts that the Authority enters into with states or state-sponsored entities in accordance with the Regulations adopted by it.[103] In other words, the rights of states or state-sponsored entities are contractual rights and corresponding contractual obligations including environment-related obligations have to be fulfilled.

[102] *Article1(1)(1) of the Convention; United Nations Convention on the Law of the Sea (UNCLOS) 1982*

[103] *The Authority has so far adopted Regulations for Prospecting and Exploration of three types of resources, namely, Polymetallic nodules, Polymetallic Sulphides and Cobalt-rich ferro manganese crusts. The Regulations for exploitation of the resources are yet to be adopted.*

What are the Resources?

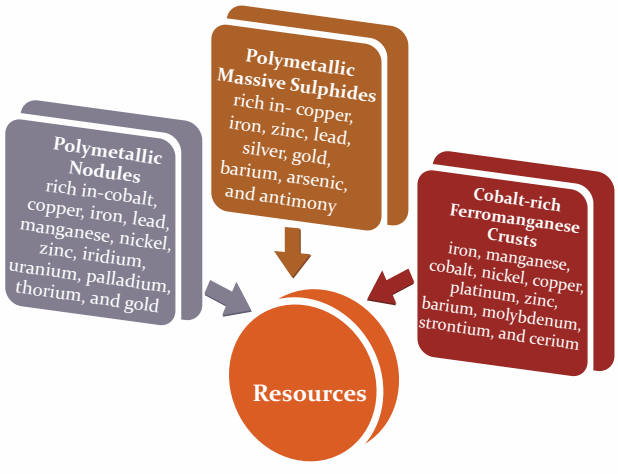
The Convention defines the term "resources" as solid, liquid or gaseous mineral resources in situ in the Area at or beneath the seabed, including polymetallic nodules. Resources when recovered from the Area are referred to as "minerals".[104] Resource potential is based on statistical evaluation of known occurrences and reserves (meaning proven deposits of known abundance and volume), geological environment, sediment type, thickness and composition. Three types of resources have been identified:

i) Polymetallic nodules are typically potato-shaped stones that range in size from that of a golf-ball to a tennis ball. They lie partially buried on the surface of sediments that cover vast plains on the deep seafloor (typical water depth 3000 metres depth or more) and could be scooped up to the surface. Polymetallic nodules are rich in cobalt, copper, iron, lead, manganese, nickel, zinc, iridium, uranium, palladium, thorium, and gold;[105]

ii) Polymetallic massive sulphides deposits are rich in copper, iron, zinc, lead, silver, gold, barium, arsenic, and antimony. The known occurrence sites are on East Pacific Rise, Galapagos Spreading Arc, Mid-Atlantic Ridge, Central Indian Ridge and marginal seas behind volcanic island chains of western Pacific.[106] Drilling and dredging is done to bring them up to the surface;

iii) Cobalt-rich ferromanganese crusts are known to contain a variety of metals such as iron, manganese, cobalt, nickel, copper, platinum, zinc, barium, molybdenum, strontium, and cerium. Cobalt-richferromanganese crusts accumulate as extensive layers directly on volcanic rock that form submerged volcanic seamounts and volcanic mountain ranges.[107] They need to be scraped to bring them up to the surface.

Figure 16: Marine Mineral Resources



Source: Compiled by FICCI from "Marine Mineral Resources: Scientific Advances and Economic Prospects, a joint publication by the Division for Ocean Affairs and the Law of the Sea, United Nations and the International Seabed Authority, (2004)"

[104] *Article 133 of the Convention; United Nations Convention on the Law of the Sea (UNCLOS) 1982*
[105] *Marine Mineral Resources: Scientific Advances and Economic Prospects, a joint publication by the Division for Ocean Affairs and the Law of the Sea, United Nations and the International Seabed Authority, (2004).*
[106] *Ibid;*
[107] *Ibid*

The three Regulations adopted by the Authority for exploration of these resources contain detailed procedures for award of contract, including the standard form of contracts, requirements of financial and technical capabilities, obligations concerning training, relinquishment, environmental impact assessment, measures for the protection of the marine environment as well as several other related matters. These are contractual obligations.

The Authority has (as of August 2019) entered into 29 contracts for exploration. Of them, 17 contracts are for exploration for polymetallic nodules: 16 in the Clarion-Clipperton Fracture Zone, and one (India) in the Central Indian Ocean Basin.

Seven contracts are for exploration for polymetallic sulphides with one in the South West Indian Ridge, three in the Central Indian Ridge (India, Germany and Republic of Korea) and three in the Mid-Atlantic Ridge.

Five contracts are for exploration for cobalt-rich crusts in the Western Pacific Ocean.

India's Perspective

Polymetallic Nodules

At the time of adoption of the Convention in 1982, four states and four entities were recognised as "pioneer investors" due to their long-standing financial commitments, and other activities relating to identification, discovery and evaluation of polymetallic nodules leading to the determination of technical and economic feasibility of exploitation. It was stipulated that the concerned state or entity should have expended at least $30 million prior to 1 January 1983, of which no less than 10% of the amount should have been spent on location, survey, and evaluation of the nodules. France, India, Japan and the former Soviet Union were expressly recognised as pioneer investors.[108] In respect of a developing state or an entity sponsored by a developing state, the cut-off date was extended to 1 January 1985.

Requirements for Registration as Pioneer Investor:

The Convention envisages a parallel or a dual system of exploration and exploitation of the resources. The underlying principle is to allow the commercial arm of the Authority (known as Enterprise which is yet to be established) would simultaneously engage in exploitation of resources (whenever that happens), along with other states or state sponsored entities and ensure that exploitation of resources of the Area are for the common benefit of mankind, as enshrined in the principle of Common Heritage of Mankind.

Accordingly, for registration as Pioneer investors, the requirement was to submit a large area (subject to a maximum of 300,000 sq. km), that could be divided into two halves of equal estimated commercial value to the Preparatory Commission of the Authority. One half of such submitted area would be registered as Pioneer area and the other reserved for the Authority (referred to as the Reserved area) for future exploitation.

India was the first country to be registered as Pioneer Investor in respect of polymetallic nodules, and the only country so registered in the Central Indian Ocean area. India's Pioneer area as registered was for 150,000km2. France, Japan and the former Soviet Union were then registered as pioneer investors in the Clarion-Clipperton Zone, lying between Hawaii and Mexico.

[108] *Resolution II of the Final Act of the Third United Nations Conference on the Law of the Sea- https://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf*

Subsequently, China, Republic of Korea and Interocean Metals (sponsored by the former Soviet Union and a group of East European countries) were also registered as pioneer investors in the Clarion-Clipperton Zone.

The Convention entered into force on November 16, 1994 and the Preparatory Commission ceased to exist from that date. Thus, there were only seven pioneer investors, namely, India, France, Japan, former Soviet Union, China, Republic of Korea and the Interocean Metal, at the time of entry into force of the Convention.

None of the other four entities described in Resolution II of the Final Act could be registered as Pioneer investors since none of their sponsoring or certifying states ratified the Convention before November 16, 1994. All of those states, however, except the United States acceded to the Convention after it entered into force. These entities thus became eligible to enter into contracts with the Authority as contractors.

Obligations as Registered Pioneer Investor

Relinquishment of pioneer area

All pioneer investors were required to relinquish 50% of their allocated area in accordance with a schedule provided in Resolution II of the Final Act. The relinquished portions will revert to the Area. India completed its relinquishment obligations in 1994.

Training Obligations

Pursuant to the parallel system of exploration and exploitation envisaged under the Convention, all Registered Pioneer Investors were required to impart training for personnel designated by the preparatory Commission of the Authority with a view to ensure that the Enterprise of the Authority is able to carry out activities in the Area in such a manner as to keep pace with states and other entities. India has completed her training obligations in respect of polymetallic nodules exploration.

India as a Contractor

Upon the entry into force of the Convention and establishment of the International Seabed Authority, the seven Registered Pioneer Investors (RPIs) were the first to enter into contracts for exploration of polymetallic nodules. The contract for exploration is initially for a period of 15 years and extendable for a further 5-year period on the expectation that the contractor is ready to proceed to the exploitation stage.

India's initial contract for 15 years for exploration of polymetallic nodules was extended in 2017 for a further 5-year period. India is thus expected to enter into a contract for exploitation in 2022. India's contract area for exploration in the Central Indian Ocean Basin covers 75,000 km2, following the 50% relinquishment from its allocated pioneer area. It is important to note that India possesses raw data in respect of the reserved area as well as in respect of the relinquished area which may be put for commercial use.

The Authority is currently working on the draft regulations for exploitation and which are expected to be finalized and adopted soon.

India's investments in Polymetallic nodules exploration

India's recognition as Pioneer Investor in 1982 and subsequent registration in 1985 was based on the requirement that a minimum of $30 million was expended before January 1, 1985, of which amount no less than 10% should have been spent on location, survey, and evaluation of the nodules. The exact amount expended on this work is not available in public domain.

An application fee of $250,000 was paid to the Preparatory Commission of the Authority in 1985 for registration.

Since the very beginning (1995), India is continuously a member of the Council of the Authority (the executive organ of the Authority) under the category of one of the four states from amongst the 8 largest investors of the world. Elections are held every four years.

India has created research institutions and facilities such as the National Institute of Ocean Technology in Chennai, and National Centre for Antarctic and Ocean Research (NCAOR) recently renamed as National Centre for Polar and Ocean Research (NCPOR) in Goa for survey and exploration as well as for extractive metallurgy, besides acquisition of ships. Several other institutions in India, notably the National Institute of Oceanography (Goa), Hindustan Zinc Limited (Udaipur), Regional Research Laboratory (Bhuvneshwar), National Metallurgical Laboratory (Jamshedpur) have also been engaged in the polymetallic nodules exploration programme. The Polymetallic nodules programme of the Government of India is one of the major thrust areas in the recently announced Rs. 8000 crore Deep Ocean Mission expected to start from October 2019.[109]

Polymetallic Sulphides

In September 2016, India signed a 15-year contract for exploration of polymetallic sulphides in the Central Indian Ocean area. In view of the geometry of polymetallic sulphides distribution, the relevant Regulations of the Authority provide for contracts in blocks. India's contract area comprises 100 blocks covering an area of 10,000 km2 with 5 clusters between 15 to 30 blocks.

Current activities include survey and exploration in the Central Indian Ridge and South West Indian Ridge for detailed studies in various probable sites for identification of potential sites of hydrothermal deposits in the allocated area, as well as training for candidates from developing countries sponsored by the Authority. The training programmes focus on marine survey and exploration techniques; acquisition and processing of marine geoscientific and oceanographic data; operation and use of various laboratory analytical equipment; and analysis, interpretation and integration of oceanographic, environmental, geological and geophysical data.

Business Opportunities

Opportunities exist for partnership and collaborative ventures with some of the industries, especially with regard to lifting, transportation, extractive metallurgy, environmental impact assessment, and restoration techniques when needed.

[109] *Article- "Centre to launch Deep Ocean Mission in October"- Jacob Koshy; The Hindu (27 July 2019)- https://www.thehindu.com/news/national/centre-to-launch-deep-ocean-mission-in-october/article28733519.ece*

International offshore majors showing interest in collaborating/joint development:

1. SMD, UK - for subsea mining machine and underwater equipment.
2. Technip, France, with an Indian subsidiary - developing the deep sea mining system.
3. GSR, Belgium - They have an area allocated in the Clarion Clipperton Zone, Pacific Ocean.
4. Keppel Corporation, Singapore – interest in collaboration on mining machine development and Environmental Impact Assessment. The corporation has high expertise in building and maintaining offshore platforms and oil and gas drilling rigs. Ocean Mineral Singapore (OMS), is a subsidiary of Keppel Corporation.
5. IHC Merwede, Netherlands - for developing mining machine, building of mining platform and the complete system.
6. SeaTech Solutions International (S) Pte Ltd, Singapore - associate in upgrading and equipping the mining platform/ship.
7. Fenner Mandals, Norway - in developing high pressure slurry hoses.

Courtesy: Dr Atmanand, Director NIOT and Dr Ramdass, Head Deep Sea technologies, NIOT

Activities relating to exploitation will also open up opportunities for joint venture operations with other contractors in the Area. Apart from direct seabed related activities, other possible business opportunities are in the area of transportation of materials recovered from deep-seabed, port facilities and storage facilities. Since India is the only country with a polymetallic nodules contract in the Central Indian Ocean and will be expected to go to the exploitation stage, various logistics arrangements that may be required should be contemplated, especially with South Africa, Mauritius and the Seychelles.

Joint venture opportunities in the reserved areas with the Enterprise is a distinct possibility as the Enterprise, when established, will be without capital and technical know-how. The only manner it can begin its functioning in an effective and competitive way is through joint venture operations.

With India's recent initiatives to collaborate with the Pacific Island States community, technical cooperation and expertise could be offered to Cook Islands, Kiribati, Tonga, and Nauru as these countries have entered into exploration contracts for polymetallic nodules with the Authority.

7

Sustainability, Planning and Financing

Sustainability, Planning and Financing

7.1 Sustainability

Sustainability means "the ability to be sustained"; it refers to the quality of not being harmful to the environment or depletion of natural resources, supporting long-term ecological balance. It is indeed "the ability to endure". It is central to the idea of sustainable development. Sustainability Science emerged in 21st century as a new academic discipline.[110] It provides a framework for sustainability.[111] Sustainability measurement provides the evidence-based quantitative data needed to guide sustainability governance. In a nutshell, it is a problem-driven and interdisciplinary subject, focusing on knowledge structuring of issues, coordination of data, and interdisciplinary approaches.[112]

"Sustainability" principle happens to be central to the "Ocean Economy", "Blue Growth", "Blue Economy", even if it has different meaning for different people. Sustainability is growing far beyond individual products and is being extended to encompass the entire product life cycle emanating from the oceans, seas and lakes.

The sustainability approach is comprehensive and is being extended to nature, including production, distribution, consumption and disposal of products. It also intends to solve the problem of plastic pollution and providing an effective and reliable business model of waste management in the Blue Economy.

According to the OECD report, "The Ocean Economy in 2030", the Blue Economy "could outperform the growth of the global economy as a whole, both in terms of value added and employment. In the coming decade, marine energy, Marine Biotechnology, Coastal Tourism, transport and food production sectors could offer unprecedented development and investment opportunities. However, there is increasing evidence that losses in the ocean's natural capital resulting from unsustainable economic activity is eroding the resource base on which such growth depends."[113]

The "business as usual" trajectory does not consider the impacts on marine ecosystems, and therefore, it is not good for business as well as to the planet and its future well-being. The "Sustainability" in the Blue Economy may be infused through sustainable Blue Economy Finance Principles,[114] which are complementary to existing principles and commitments in sustainable financing. These principles are voluntary in nature; and do not create any rights or liabilities. There are 14 Sustainable Blue Economy

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[110] *Kates, R.; Clark, W.; Corell, R.; Hall, J.; Jaeger, C.; et al. (2001). "Sustainability Science". Science. 292 (5517): 641-642*

[111] *Komiyama, H., Takeuchi, K. 2006. Sustainability science: building a new discipline. Sustainability Science 1:1-6*

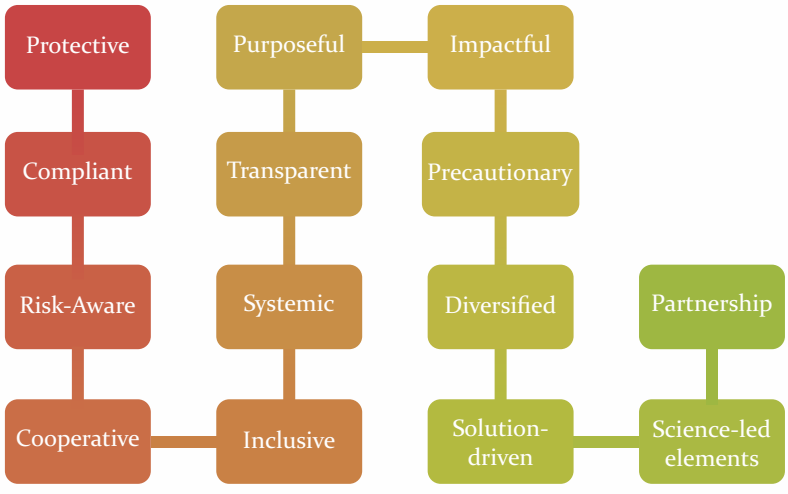
[112] *It has been argues that Sustainability Science is "gained especially from the holistic and historical sciences (such as geology, ecology, climatology, oceanography) coordinated with knowledge about human interrelationships gained from the social sciences and humanities, in order to evaluate, mitigate, and minimize the consequences, regionally and worldwide, of human impacts on planetary systems and on societies across the globe and into the future - that is, in order that humans can be knowledgeable Earth stewards. For a view on the issue refer Kieffer, S.W., Barton, P., Palmer, A.R., Reitan, P.H., & Zen, E. 2003. "Megascale events: Natural disasters and human behavior". Geological Society of America Abstracts with programs: 432.*

[113] *Declaration of the Sustainable Blue Economy Finance Principles; European Commission, WWF, International Sustainability Unit, European Investment Bank (March 2018) https://www.wwf.org.uk/sites/default/files/2018-03/Declaration%20of%20the%20Sustainable%20Blue%20Economy%20Finance%20Principles_Brochure%20Insert_2018.pdf*

[114] *Ibid*

Finance Principles such as: protective; compliant; risk-aware; systemic; inclusive; cooperative; transparent; purposeful; impactful; precautionary; diversified; solution-driven; partnership; and science-led elements in it. These principles are self-explanatory.[115]

Figure 17: Sustainable Blue Economy Finance Principles



Source: Compiled by FICCI from "Declaration of the Sustainable Blue Economy Finance Principles"; EU, WWF, International Sustainability Unit and the EU Bank (March 2018)

Currently at around 7 billion, the Earth's population is expected to reach 8 billion by 2027. This significant rise will generate more demand for goods and services, which will further put pressure on the ocean resources and thus, making sustainability more relevant for achieving SDGs by 2030. The key sustainability challenges confronting the society are complex The solution lies in adopting "Sustainability" which implies sustainable production and consumption of products, innovations in sustainable food systems, and transition towards a low-carbon society. The importance of sustainability was reiterated at the conference held in Kenya last year.

The main sectors of the Blue Economy include ocean fisheries, tourism, transportation, marine energy, seabed mining for minerals and blue carbon sequestration by restoring mangroves and seagrasses. Restoring, protecting and maintaining the diversity, productivity and resilience of marine ecosystems, will require clean technologies as well as latest technologies such as Robotics, Nanotechnology, Digitalization and Artificial Intelligence (AI) etc; renewable energy; and circular material flows. Even in the "Circular Economy", the concept of "Sustainability" is important and relevant. In a circular economy, all the economic activities build or rebuild the overall health of the system. It recognises the importance of the economy

[115] *Declaration of the Sustainable Blue Economy Finance Principles (March 2018); EU, WWF, International Sustainability Unit and the EU Bank- https://ec.europa.eu/maritimeaffairs/sites/maritimeaffairs/files/declaration-sustainable-blue-economy-finance-principles_en.pdf*

needing to work effectively at all scales – for large and small businesses, for organisations and individuals, globally and locally. Thus, the local community is common in both the Blue Economy as well as the Circular Economy. The Circular Economy represents a systemic shift that builds long-term resilience, generates business and economic opportunities, and provides environmental and societal benefits. Hence, it is evident that Sustainability is central to both types of economies.

The Third World Circular Economy Forum meeting was held in June 2019 in Helsinki to discuss how businesses can seize new opportunities and gain a competitive advantage through Circular Economy and its contribution to achieving the SDGs.[116] The US Chamber of Commerce Foundation, Washington DC, hosted 'Sustainability and Circular Economy Seminar' in June 2019.[117] The National Productivity Council (NPC), New Delhi, India, established in 1985 by Ministry of Industry, Government of India celebrated the National Productivity Week from 12-18 February 2019 to make the transition from Linear to Circular Economy that embraces economic growth and environmental sustainability.[118] These developments certainly indicate the importance of bringing "Sustainability" to the center of the Blue Economy as well as Circular Economy to achieve the SDGs by 2030.

The 'Sustainability Science' and the concept of 'Sustainability' which has its roots in Sustainable Development and Environmental protection, is increasingly being recognized at global, regional, national and local levels, and in IORA, as a central and fundamental principle of Sustainable Blue Economy-including Circular Economy which is a part of the Blue Economy. That rightly implies the integration of the Blue Economy with land-locked states. The oceans belong to all, and their productivity is enhanced through the adoption of 'Sustainability.'

Blue Economy includes the Circular Economy but goes beyond it. Both are about radical resource productivity, zero waste and Sustainability. Blue Economy is more comprehensive as it shifts away from core business/core competence that force companies to focus on one industry by considering local economic development as a priority, ensuring that local purchasing power increases and more money circulates regionally. This enables growth without inflation through an increase in local production of goods and services. Blue Economy focuses on the notion that nothing is waste; and it is guided by 23 explicit principles framed by Gunter Pauli. It takes into consideration Global Progress Indicators (GPI) rather than Gross Domestic Product (GDP) which attempts to factor in the degradation of the environment. Blue Economy also emphasizes the "innovativeness" (all inspired by nature with zero waste) to create jobs along with efficiency. There are Models of Success and Sustainability (MOSS) as reflected in Vortex Processing Technology (VPT) - A multi-application Blue Economy Innovation; along with Industrial Vortex Generators (IVG) which change the properties of water crystallizing line particles, see more air bubbles etc.; and the "blow down" water can be re-used without treatment a second time before going to the sewage.

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[116] *For explanation of these principles, see "Declaration of the Sustainable Blue Economy Finance Principles (March 2018) ;EU, WWF International Sustainability Unit and European Investment Bank- https://ec.europa.eu/maritimeaffairs/sites/maritimeaffairs/files/declaration-sustainable-blue-economy-finance-principles_en.pdf*

[117] *World Circular Economy Forum 2019- https://sdg.iisd.org/events/world-circular-economy-forum-2019-wcef2019/*

[118] *National Productivity Week (February 12-18, 2019)- currentaffairs.gktoday.in/national-productivity-week-february-12-18-2019-022019065935.html*

Figure 18: Models of Success and Sustainability

Source: Compiled by FICCI

The oceans, seas and lakes comprise global or national commons and, therefore, it will need rules and regulations, international agreements and financing principles that cannot be borrowed and adopted from those of the "business as usual" model. A sustained and coordinated effort is needed from all states, including all international organisations and other related with important ocean jurisdictions, to re-examine and evolve their rules and performance in the context of this Sustainable Blue Economy's new objective of achieving SDG14.

The objective of Sustainable Development is well enshrined in the IORA's Charter since its establishment in March 1997. The Sustainable Blue Economy Conference in Nairobi concluded with numerous pledges to advance a Sustainable Blue Economy, including 62 concrete commitments related to:marine protection, biodiversity, climate change, financing, infrastructure, fisheries development, plastic and waste management, technical and capacity building, private sector support, and partnerships.[119]

IORA has already committed itself to Sustainability Principle(s) through its First and Second Ministerial Conferences held in September 2015 (Mauritius) and May 2017 (Indonesia). The Third Ministerial Conference on Blue Economy was held on 4-5 September 2019 in Dhaka, Bangladesh, to further strengthen and expand Sustainability in the implementation of Sustainable Blue Economy in Indian Ocean Region (IOR).

Education is critical in adopting and nurturing the Blue Economy, increasing its awareness, potential and skills. Industry and education sectors should come close to each other in evolving business models, adopting system thinking, re-designing their products and processes and exploring reuse, re-manufacturing and recycling by resorting to the sustainability principles. It is also important to note that "Inclusiveness", "Diversity", and "Sustainability" are interconnected; and the adherence to the principles of sustainability in the context of complex issues of diversity, social justice and inclusion needs to be fully addressed by the Blue Economy. It has been recognized globally that sustainability in the implementation of the Blue Economy is the only way to ensure an equitable and inclusive society in the future.

[119] *Conference Reports on advancing Global Sustainable Blue Economy; Ministry of Foreign Affairs, Government of Kenya- http://www.blueeconomyconference.go.ke/documents/*

7.2 Marine Spatial Planning

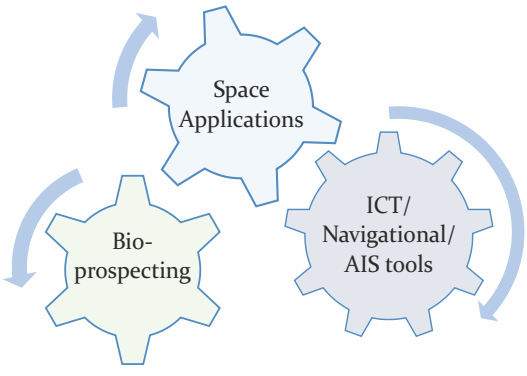
With growing population pressure and depleting land resources, there will be a race to the oceans for more food, energy, transport, communications, recreation, new materials and many more marine services. This runs the risk of not only forcing greater spatial competition but also conflicts. These complex and overlapping operations will also render regulation much more difficult. It is, therefore, essential that the campaign for harnessing the ocean resources is also accompanied by better and timely spatial planning to mitigate conflicts and to ensure sustainability. Such efforts initially led to the introduction of "integrated coastal zone management" and "marine protected areas" by many coastal states with encouraging results. The society is now seeking to carry this process further to comprehensive ecosystem-based MSP with primacy to sustainability and operating within the carrying capacity of the concerned ecosystems. Such planning applies to national jurisdictions,beyond them, it would depend on international agreement. MSP should also integrate marine and adjoining land ecosystems for better coordination and assessment of impacting factors.

MSP is a knowledge-driven system, which takes an integrated approach for determining suitability of any operation/s within an ecosystem, allocation of optimal space and appropriate regulation. By the very nature, it would involve public authority, regulatory bodies, enforcement agencies, knowledge partners, operational stakeholders and the civil society. The MSP is dynamic and interactive.

MSP is a relatively new concept. While its importance is being discussed and realised at various regional and global platforms, only a few governments have started applying MSPs in a limited way. Some success stories are from Europe, the US and Australia but most countries, especially developing countries, are grappling with the challenge of generating necessary domain awareness, both of ecosystem and operations for developing appropriate approaches and plans. It will necessarily need close regional and global collaboration for data gathering and sharing. EU has adopted a regulation making it mandatory for all its coastal member-states to develop MSPs by 2021.

MSP would be an essential future enabler to harness the Blue Growth. India has the technical capabilities for generating and analyzing relevant data and information through space applications, ICT/navigational/AIS tools, bioprospecting and a variety of other marine domain awareness capabilities. These are essential for developing MSPs. India should not only utilise these capabilities for developing its own MSPs, but should also assist other partners in the region for similar goals.

Figure 19: India's tools to generate MSP



Source: Compiled by FICCI

7.3 Financing

Most scholars and experts have been projecting the Blue Economy as a new paradigm for growth with sustainability. Down the line, especially at the general public level, these arguments also seem to give an impression as if the Blue Economy is seeking to promote a completely new economic model/framework, which may need massive investments by way of adaptations or capacity generation/expansion. Hence, the business community is seeking greater clarity on the financing of this new paradigm.

Innovation and entrepreneurship are important facets of the development of the Blue Economy. SMEs, entrepreneurs and start-ups act as catalysts. They are often constrained by lack of funds and find it difficult to organise requisite finances to turn their ideas into operations. The governments are cautious of sharing finances with private agencies/individuals and prefer only their institutions to provide financial support for research and development. There is now growing evidence that "impact investment" can perform at least as well as traditional investments in terms of financial return.

Sectoral growth opportunities have been spelt out in the earlier chapter and they would mean additional business opportunities running into billions of dollars. These sectors would also generate millions of quality jobs. The business community should start preparing for expansion, especially in fisheries, tourism, transport and energy. Investments in marine biotechnology, spatial planning, R&D, deep sea minerals would have to be initially driven by the public sector. The principal sources of finance/investment would be private sector, public finance, FDI, multilateral and bilateral aid/financing institutions, equity/debt market. Of late, the sustainable, green and blue bonds have been used for raising large amounts from the open market, including by private ventures. This Report would wish to clarify that the Blue Economy essentially comprises a set of economic activities which have always been an integral part of the human development history.

The global economy is forecast to grow from the current estimates of about $93 trillion to about $173 trillion by 2031. This expansion will need resources including investments for capacity expansion, adaptations of existing operations, new sectors, technology development and induction, and new management tools. The success of our generation in combining growth with sustainability would depend on our preparedness for addressing inadequacies of policy, regulation, technology, finance and management tools. The Blue Economy is seeking precisely this paradigm shift.

The WWF estimates the value of the ocean assets at $24 trillion with an annual value addition of about $2.4 trillion. According to the OECD, the ocean economy will surpass its land counterparts both in value addition and employment generation by 2030. Such a growth would demand matching investments. The question is where will this money come from?

Investors across the globe are slowly getting accustomed to the term Blue Economy and have demonstrated interest in investing in opportunities offered by the oceans, seas and coastal marine goods and services; likewise, public-private partnership for development of the Blue Economy has received attention. However, the major challenge so far has been a lack of understanding between the investment needs of state governments and communities, and the investment aspirations of businesses and companies. Further, investors and entrepreneurs/ start-ups have not been networked to encourage adopting an integrated approach to the development of the Blue Economy.

In keeping with the growing public sentiment in favour of sustainability, the global financial institutions have started a major campaign for green and sustainable tagging of investments. The World Bank Group led

the way by directing investments into sustainable ventures by introducing the first ever Green Bonds in 2008. This initiative created the framework for the present-day green bond market. Since then, the World Bank Group has raised more than $13 billion through some 150 green bonds in 20 currencies for institutional and retail investors. Till end 2018, there were 91 projects with a total of US$15.4 billion in commitments, for projects relating to clean energy, water management and climate change mitigation.

Taking the cue, Seychelles issued the first ever sovereign Blue Bonds to raise $15 million last year. Earlier this year, the Nordiac Investment Bank announced issue of Nordiac Baltic Blue Bonds, which were twice over subscribed, raising SEK 2 billion. Morgan Stanley and Co. sold the World Bank sustainable development bonds worth $ 10 million for addressing plastic pollution.

There have also been important initiatives for raising money through the green bonds by some Indian banks and private companies. According to a YES bank report for 2017-18, the green bond market in India has witnessed surprising growth since its inception in early 2015. By the end of the report period, the size of the Indian Green bond market was estimated at over 50,000 crores with a total of 25 issuances, including foreign currency denominated bonds. According to the "Bonds and Climate Change: The State of the Market 2018", the cumulative green issuance from India between 2015 and 2018 stood at $6.5 billion. In 2017, Indian public and private sector companies issued $3.9 billion worth of green bonds, 2.5 times higher than in 2016. The majority of them (51%) were sold by public sector entities.

Major foreign currency denominated green bonds have been issued by: i) SBI for $650 million (2018); ii) Hyderabad based Greenko Group for $950 million (Live mint July 2019); iii) Hero Future Energies Group has issued a series of climate bonds for financing their clean energy projects; iv) YES Bank for $600 million (2019); v) Adani group for $500 million (2019) to finance clean energy.

The green, sustainable or even blue bond market will expand further. According to some estimates, India would need $2.3 trillion for meeting climate related obligations alone till 2030.

The complete picture as to how the global investors are turning towards greener and cleaner investment portfolios could be judged from the fact that till last year, an estimated $30.7 trillion worth of funds were held in green or sustainable investments, which represents a growth of 34% compared to 2016. According to the global sustainable investment alliance, in Europe last year, over 48% of the total managed investments of $14 trillion, were deployed in green or sustainable assets. In the US, of the total $12 trillion, the share of green and sustainable investments was 25.7%. This share exceeds 50% in case of Canada and Australia.[120]

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[120] *Climate Bonds Initiative (2019)- www.climatebonds.net*
https://www.bloomberg.com/graphics/2019-green-finance/
IBRD Funding Program; The World Bank- https://treasury.worldbank.org/en/about/unit/treasury/ibrd/ibrd-green-bonds
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8

Recommendations

Recommendations

Flowing from the foregoing analysis and on the basis of widespread consultations, the FICCI Core Group on Blue Economy presents a set of recommendations pertaining to strategic, institutional and sectoral aspects as well as industry engagement.

Strategy

The Blue Economy strategy of India should have three critical ingredients:

- Economic growth balanced by sustainable development;
- A Public Private Partnership (PPP) encompassing governments at the Centre and state levels as well as Business and Industry and Civil Society; and,
- Essentially a multi-disciplinary approach covering all relevant stakeholders.

Institutional

- In order to implement the desired strategy, the country may, in the medium term, need a full-fledged Ministry of Blue Economy
- However, as an immediate measure, the Government is urged to design and establish an effective institutional mechanism for coordination and leadership, covering all relevant authorities and stakeholders
- Create a new Blue Economy Policy Unit for external dialogue and cooperation projects and consider locating it in the Ministry of External Affairs
- Launch a new 'India Blue Economy Forum' comprising representatives of Government, Business and private sector experts, for sustained dialogue and follow-up, while ensuring that it functions as a collective public-private partnership enterprise and serves as a bridge linking all the relevant stakeholders. It could be anchored in an appropriate institution or organisation such as FICCI
- Nurture, in a practical and sustained manner, India's multifaceted ties with relevant multilateral and regional organisations
- A national Blue Economy accounting system should be developed to obtain a holistic understanding and value of various sectors to provide robust policy prescriptions.

Sectoral

- Undertake focused studies on the sub-sectors of the Blue Economy such as marine leisure industry, role of Industry 4.0 technologies, smart river management, marine biotechnology, offshore renewable energy and fisheries related sectors

- Engage IITs and other institutions to encourage innovation to support the Blue Economy
- Explore and popularise the concept of Green and Blue Bonds
- Create Blue Economy Atlas as a valuable business tool for all coastal states and island territories of India (The proposed Atlas would be a compilation of relevant sectors and their economic value)
- While commercial deep sea mining may not take place in the near future, preparations for legal and contractual formalities should be undertaken
- On the policy aspect, India should support signing of exploitation contracts when the term of current exploration contracts come to an end. Upon signing of the first exploitation contract it becomes obligatory to set up the commercial arm of the International Seabed Authority, namely, the "Enterprise". The main function of the Enterprise is to begin seabed mineral exploitation in the reserved areas, simultaneously, with other contractors
- India should explore the possibilities of joint venture operations with the Enterprise, the commerical arm of the International Seabed Authority, as soon as it is established
- India should be prepared to play a proactive role in the Governing Board of the Enterprise, when established
- India should also be prepared to seek representation in the Economic and Planning Commission of the ISA once established
- India should explore partnerships and collaborative ventures relating to lifting, transportation, extractive metallurgy, environmental impact assessment, and restoration techniques
- India should also explore business opportunities in the area of transportation of materials recovered from deep-seabed, port facilities and storage facilities. It could also devise colloborations with South Africa, Mauritius and Seychelles in infrastructure and logistics arrangements that may be required
- Indian authorities and industry should plan careful and focused expansion of capacities, both through the capture and culture route to take advantage of the expanding demand supply gap, which would need an additional global production of over 30 MMTs by 2030
- Capacity expansion must be pursued with sustainability by paying special attention to ecosystem driven approaches to fish stock management, less polluting feed/disease control methods, high value culture varieties and avoidance of gene pool contamination
- Adopt measures to reduce wastage through the entire supply chain from catch to plate
- Introduce better quality assurance and certification system, including hygiene and cold supply chains
- Promote research in marine biotechnology, especially marine metabolites
- Greater emphasis on improving coastal and marine tourism infrastructure, including connectivity, quality accommodation, hygiene and security
- Initiate pilot projects for introducing and promoting ecosystem based marine spatial planning, which in due course could be extended to larger ocean spaces
- Adopt proactive measures to reduce marine litter, which also offers business opportunities.

Industry Engagement

- Organise a launch to publicise and project to a wider audience the contents and findings of this Knowledge Report
- Hold dissemination seminars/workshops in the principal towns of coastal India, in collaboration with experts from interested countries
- Host an international conference and exhibition on the Blue Economy in New Delhi, involving the member-countries of IORA, BIMSTEC, ASEAN and a few other select countries, with the specific purpose of strengthening B-to-B dialogue
- Encourage the industry partners to progressively integrate the principles of sustainability in their production and value chain management
- Engage the industry into the Blue Economy discourse to promote the bottoms-up approach and local ownership. They may also be encouraged to develop appropriate road maps for promoting sustainable Blue Growth
- Facilitate industry participation in international marine and maritime related expos, trade fairs and shows
- Prepare yellow pages for industries, MSMEs, entrepreneurs and start-ups to share expertise, knowledge and opportunities for business.

9

What Next?

What Next?

The Blue Economy is a work in progress in India. FICCI, as the premier national business chamber, is expected to take the fundamental message of this report to India Inc in every possible manner. It is only when business and industry begin to be inspired by the vision of the Blue Economy and start creating additional wealth for the nation that sustainable development would be ensured.

For this purpose, FICCI would continue to seek the advice and assistance of experts. While the mandate of the Core Group on Blue Economy ends with the submission of this report, the Core Group will remain available to extend such assistance as may be required from it in future.

Annexures

I. Tentative list of companies involved in deep sea mining activities

Cook Islands Investment Corporation

UK Seabed Resources Ltd

Ocean Mineral Singapore Pte Ltd.

G-TEC Sea Mineral Resources NV, Belgium

Marawa Research and Exploration Ltd, Kiribati

Tonga Offshore Mining Limited

Nauru Ocean Resources Inc.

Federal Institute for Geosciences and Natural Resources of Germany

Institut français de recherche pour l'exploitation de la mer

Deep Ocean Resources Development Co. Ltd.

China Minmetals Corporation

China Ocean Mineral Resources Research and Development Association (COMRA)

Companhia De Pesquisa de Recursos Minerais, Brazil

Japan Oil, Gas and Metals National Corporation (JOGMEC)

II. Major Deep-sea Mining Consortias at the time of adoption of the United Nations Convention on the Law of the Sea, 1982

Source: United Nations, Seabed Mineral Resource Development, ST/ESA/107/ Add.1 (1982)

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   Rio Tinto-Zinc (UK)
   RTZ Deepsea Enterprises, Ltd (UK)
   Consolidated Gold Fields, PLC (UK)
   BP Petroleum Development Ltd (UK)
   Noranda Exploration Corporation (Canada)
   Mitsubishi Group (Japan)
2. Ocean Mining Associates (USA). Participants:
   Essex Minerals Company (USA)
   Union Seas Inc (Belgium)
   Sun Ocean Ventures (USA)
   Samim Ocean Inc (Italy)

3. Ocean Management Incorporated (USA). Participants:

   Inco, Ltd (Canada)

   AMR Group (Germany. Then FRG)

   Sedco, Inc (USA)

   Deep Ocean Mining Company, Ltd (Japan)

4. Ocean Minerals Company (USA). Participants:

   Amco Ocean Minerals Company (USA)

   Lockheed Systems Company, Inc ((USA)

   Billiton B.V. (Netherlands)

   Ocean Minerals, Inc (USA)

   BKW Ocean Minerals BV (Netherlands)

5. Association Francaise pour l'etude la recherché des nodules (AFERNOD) (France) Participants:

   Centre national pour l'exploitation des oceans (CNEXO) France

   Commissariat a l'energie atomique (CEA) France

   Societe metallurgique le nickel (SLN) France

   Chantiers de France-Dunkerque (France)

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   Itoh and Company Ltd (Japan)

   Marubeni Corporation (Japan)

   Mitsubishi Corporation (Japan)

   Mitsui and Company Ltd (Japan)

   Nichimen Company Ltd (Japan)

   Nissho Iwai Corporation (Japan)

   Sumitomo Corporation (Japan)

   Dowa Mining Company, Ltd (Japan)

   Furukawa Company Ltd, (Japan)

   Japan Metals and Chemicals Company

   Mitsubishi Metal Corporation (Japan)

   Mitsui Mining and Smelting Company, Ltd (Japan)

   Nippon Mining Company (Japan)

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2) Employment, Job Creation, Poverty Eradication and the Blue Economy
3) Cities, Tourism, Resilient Coasts and Infrastructure
4) Sustainable Energy and Mineral Resources and Innovative Industries
5) Ending Hunger, Securing Food Supplies and Promoting Good Health and Sustainable Fisheries
6) Management and Sustaining of Marine Life, Conservation and Sustainable Economic Activities
7) Climate Action, Agriculture, Waste Management and Pollution-free Oceans
8) Maritime, Safety, Security and Regulatory Enforcement.
9) People, Culture, Communities and Societies: The Inclusive Blue Economy.

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FICCI Core Group of Experts on Blue Economy: Profiles

Ambassador Rajiv Bhatia,
Chair; Distinguished Fellow, Gateway House

Ambassador Rajiv Bhatia is a Distinguished Fellow, Foreign Policy Studies Programme at Gateway House. He is Chair of FICCI's Task Force on Blue Economy and FICCI's Core Group of Experts on BIMSTEC. He is a founding member of Kalinga International Foundation. As Director General of the Indian Council of World Affairs (ICWA) from 2012-15, he played a key role in strengthening India's Track-II research and outreach activities. During a 37-year innings in the Indian Foreign Service (IFS), he served as Ambassador to Myanmar and Mexico and as High Commissioner to Kenya and South Africa. He dealt with a part of South Asia, while posted as Joint Secretary in the Ministry of External Affairs. A prolific columnist, he also delivers lectures on foreign policy issues in India and abroad. He was Senior Visiting Research Fellow during 2011-13 at the Institute of Southeast Asian Studies (ISEAS), Singapore. He holds a Masters degree in political science from Allahabad University. His first book *India in Global Affairs: Perspectives from Sapru House* (KW Publishers, 2015) offers a panoramic view of India's foreign policy. His second book *India-Myanmar Relations: Changing contours (Routledge, 2016)* received critical acclaim.

Ambassador Anup Mudgal
Member; former High Commissioner to Mauritius

Ambassador Anup K. Mudgal, a member of the Indian Foreign Service (IFS) retired in May, 2016 as India's High Commissioner to Mauritius. As part of his diplomatic carrier spanning thirty two years, he served thrice at the Head Quarters of the Ministry of External Affairs handling relations with India's neighborhood; ASEAN region; Russian Federation and some countries of Central and Eastern Europe as well issues relating to Human Resource Development.

As part of his eight assignments abroad Amb. Mudgal served in different capacities at the Indian Missions in **Mexico (including NAFTA matters), Peru, former Yugoslavia, Belgium (EU matters), Germany, Austria (work relating to: IAEA, UNIDO, UNODC, UNOOSA, UNCITRAL), and Mauritius (including IORA).**

Post retirement, Amb Mudgal has been engaged in several voluntary assignments, the important ones being: Member, FICCI Task Force on Blue Economy; Member, Steering Committee on Blue Economy under PMEAC; Member, Core Team of Kalinga International Foundation; Chair, Diaspora Committee, ARSP; Joint Secretary, Association of Indian Diplomats; Guest lectures at various higher education and professional institutes.

Born in May, 1956, Amb Mudgal did most of his education in Delhi. He holds Masters' and M.Phil degrees in plant sciences from University of Delhi. He speaks Hindi, English and Spanish. Previously, he also briefly worked at the Department of Science and Technology, New Delhi and as a member of the Indian Forest Service.

Dr Vijay Sakhuja
Member; former Director
National Maritime
Foundation

Dr Vijay Sakhuja is former Director, National Maritime Foundation, New Delhi, India. He is currently Visiting Senior Fellow, Cambodian Institute for Cooperation and Peace (CICP), Phnom Penh; Distinguished Fellow, Centre for Public Policy Research (CPPR) Kochi; Co-founder and Trustee of The Peninsula Foundation (TPF) Chennai; and is associated with Kalinga International Foundation and Vivekananda International Foundation, New Delhi.

He has been on the faculty of a number of think tanks and universities in India and abroad - Visiting Senior Research Fellow, RSIS, Nanyang Technological University (NTU), Singapore; Institute of Southeast Asian Studies (ISEAS), Singapore; Senior Fellow Gujarat National Law University, India; Director (Research), Indian Council of World Affairs (ICWA); Senior Fellow, Centre for Airpower Studies (CAPS) and Observer Research Foundation (ORF); Research Fellow at the Institute for Defence Studies and Analyses (IDSA), and United Service Institution of India (USI).

A former Indian Navy officer, Sakhuja received MPhil and PhD degrees from the Jawaharlal Nehru University in New Delhi. He specializes in Indo-Pacific affairs, maritime security, climate change, Arctic affairs, Blue Economy and 4th Industrial Revolution technologies. He has published over 40 books, edited volumes and monographs.

He is author of 'Asian Maritime Power in the 21st Century: Strategic Transactions - China, India, Southeast Asia'; 'Confidence Building from the Sea: An Indian Initiative'; co-author of 'Climate Change and the Bay of Bengal: Evolving Geographies of Fear and Hope'; His recent academic works are Asia and the Arctic: Narratives, Perspectives and Policies (2016); Perspectives on Blue Economy (2017); The Blue Economy: Concept, Constituents and Development(2017); South Asia Defence & Strategic Perspective(2017, 2018 and 2019); Indian Navy Yearbook 2019 : Perspectives and Technologies; and Sea of Collective Destiny: Bay of Bengal and BIMSTEC (forthcoming) and South Asia Defence & Strategic Perspective 2020 (forthcoming).

Dr Vijay Sakhuja is member of the international editorial board of Journal of Indian Ocean Region (Taylor & Francis) and Journal of Greater Mekong Studies.

Mr H.P. Rajan
Member; former Deputy
Director, Division for
Ocean Affairs and Law of
the Sea, United Nations

Mr. H. P. Rajan retired from the United Nations, New York where he served as Deputy Director, Division for Ocean Affairs and the Law of the Sea (DOALOS), Office of Legal Affairs, and Secretary of the Commission on the Limits of the Continental shelf, and Secretary of the Meetings of the States Parties to the UN Convention on the Law of the Sea, until 31 December 2011. He was one of the UNITAR-IPA Fellow on Conflict Resolution and Preventive Diplomacy, in 2007. He has also served as Special Assistant to the Secretary General and Chief, Office of Administration and Management, International Seabed Authority, Kingston, Jamaica. He was also one of the first elected Members of the Legal and Technical Commission. Prior to joining the United Nations, he was Adviser in the then Department of Ocean Development, Government of India. His earlier assignments in the career include serving as Director (Antarctica), Government of India, Legal Adviser to the Republic of Maldives, as well as teaching and guiding research as Assistant Professor of International Law at the School of International Studies, Jawaharlal Nehru University. Post retirement from the United Nations, he has been the Legal Adviser for Law of the Sea to the Asian African Legal Consultative Organization, Visiting Professor and Senior Fellow at Gujarat National Law University, and is currently a Member of the Working Group on Coastal & Deep Sea Mining and Offshore Energy for National Blue Economy and Sustainable Development Policy constituted by the Economic Advisory Council to the Prime Minister.

Prof. V.N. Attri
Member; Chair, Indian Ocean Studies, IORA, University of Mauritius

Prof. V N Attri is Chair, Indian Ocean Studies (CIOS), Indian Ocean Rim Association (IORA), University of Mauritius, Mauritius. His policy briefs have been published in United Nations Global Sustainable Development Reports (2015, 2016). He is former ICSSR Senior Fellow, Government of India, and New Delhi.

He has been a visiting scholar at University of California, Los Angeles, CA, USA and Visitor at the George Washington University, Washington DC, USA. He is a lead editor with the Human Sciences Research Council (HSRC), on the Blue Economy Handbook. The CIOS has initiated the quarterly Online Journal of Indian Ocean Rim Studies (JIORS); the first issue of the journal was published in May 2017. He is on the editorial board of many international journals.

Additionally, he has participated in IORA's Core Group Meetings and First Ministerial Conference on the Blue Economy. He has been acknowledged by The World Bank as an expert on Blue Economy and was invited to make an external review of the report, "Toward a Blue Economy: Pathways and Prospects for Bangladesh's Investment in Sustainable Growth" (March 2018).

He has been invited to various summits and conferences including the "United Nations Expert Group Meeting on Exponential Technological Change, Artificial Intelligence, Automation, and Their Policy Implications for Sustainable Development", session "Our Ocean Economy: The role of Education in Transitioning to a Blue Economy", 5th Indian Ocean Dialogue (IOD), Sustainable Blue Economy in Nairobi, Kenya, and many more.

Ms Sushma Nair
Member; Additional Director and Head, Multilateral Engagement & Forum of Parliamentarians FICCI

Sushma leads the Blue Economy initiative at FICCI with a mandate to develop the long-term strategy, industry-oriented knowledge content and outreach to diverse stakeholders in India and abroad at bilateral and multilateral levels.

With over two decades of experience, shared between not for profit organisations and the private sector, her current role at FICCI is divided evenly between FICCI's Forum of Parliamentarians and Multilateral Engagement.

As part of the multilateral agenda of FICCI, she is responsible for promotion of multilateral economic relations through regional and sub regional engagement and leading new initiatives such as the FICCI Taskforce on Blue Economy and the FICCI Core Group on BIMSTEC. She articulates strategy for FICCI's role as Secretariat of Indian Ocean Rim Association (IORA) and Shanghai Cooperation Organisation (SCO).

In her earlier role with FICCI as Head of the Europe Division she had responsibility for regional and country strategy, knowledge initiatives, projects and mission management. Her private sector experience includes corporate communications, partnership development and knowledge initiatives.

Sushma is an alumnus of Delhi School of Economics, Delhi University. She holds Masters degrees in Economics as well as Journalism and Mass Communications.

KONRAD ADENAUER STIFTUNG

Freedom, justice and solidarity are the basic principles underlying the work of the Konrad-Adenauer-Stiftung (KAS). The KAS is a political foundation, with a strong presence throughout Germany and all over the world.

The Konrad-Adenauer-Stiftung has organised its program priorities in India into five working areas:

- Political Dialogue and cooperation
- Foreign and Security Policy including Energy Policy
- Economic policy and management development
- Rule of Law
- Media and training programmes for students of journalism

In implementing its project and programs the Foundation cooperates with Indian partner organisations, such as think tanks, Government and Non-Governmental Institutions.

FICCI
Federation of Indian Chambers of Commerce and Industry

Established in 1927, FICCI is the largest and oldest apex business organisation in India. Its history is closely interwoven with India's struggle for independence, its industrialization, and its emergence as one of the most rapidly growing global economies.

A non-government, not-for-profit organisation, FICCI is the voice of India's business and industry.

From influencing policy to encouraging debate, engaging with policy makers and civil society, FICCI articulates the views and concerns of industry. It serves its members from the Indian private and public corporate sectors and multinational companies, drawing its strength from diverse regional chambers of commerce and industry across states, reaching out to over 2,50,000 companies.

FICCI provides a platform for networking and consensus building within and across sectors and is the first port of call for Indian industry, policy makers and the international business community.