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Ensuring sustainability of oceans for a healthy economy- securing livelihoods, preserving biodiversity and addressing socio-economic challenges

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Working Paper

Acknowledgement

This the first working paper by TERI as part of the Quadrilateral dialogue series being jointly implemented by Konrad Adenauer Stiftung India office and National Maritime Foundation and FICCI. This paper focuses on the theme of "Ensuring sustainability of oceans for a healthy economy- securing livelihoods, preserving biodiversity and addressing socio-economic challenges". We would take this opportunity to thank Konrad Adenauer Stiftung India office and our implementation partners National Maritime Foundation and FICCI for their partnership and continued support for the series. Papers presented during this series will also be published as a part of book. This working Paper is also the foundation for one of the chapters in the book.

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INTRODUCTION

The Ocean has been a provider for the world both as source of resources and as means for interlinking different countries and lands. The available research and understanding still falls short of explaining the vast expanse that we call oceans. The invigorating deliberations on Blue economy emphasizes on accelerating scientific assessments and pushing economic development while being conscious of a blue environment that is evolving rapidly largely due to human interventions.

India has been aiming to consolidate and form a framework for Blue economy for the country, a task that is challenging and complex due to its multilayered concept and characteristics. Yet, India is taking steps to recognize the oceans contribution. During the announcement of the 2020 budget, the finance minister of India mentioned the importance of blue economy and allocated a substantial budget to fisheries. This emergence of blue economy in India's budget signals the gaining prominence of the sector. According to the working group report on National Accounting Framework and Ocean Governance by the Economic Advisory Council to the Prime Minister of India, the total Gross Value Added (GVA) of Blue economy has expanded from INR3.3 lakh crore in 2011-12 to

INR4.6 lakh crore in 2016-17. In addition to the rising GVA, Blue economy has shown a steady annual growth rate as well and is currently growing at a higher rate than the overall economy. (See Fig 1 and 2)

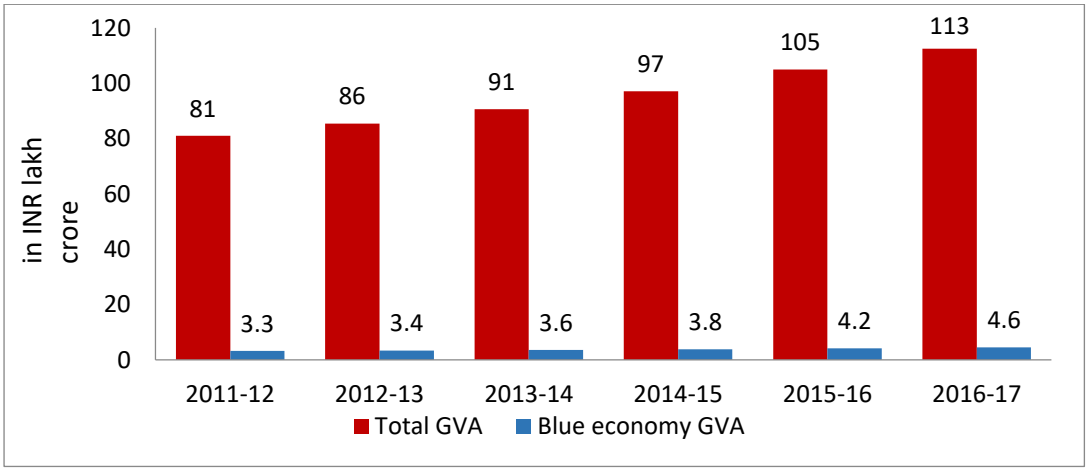

Figure 1: Annual Growth rate total GVA Vs Blue economy

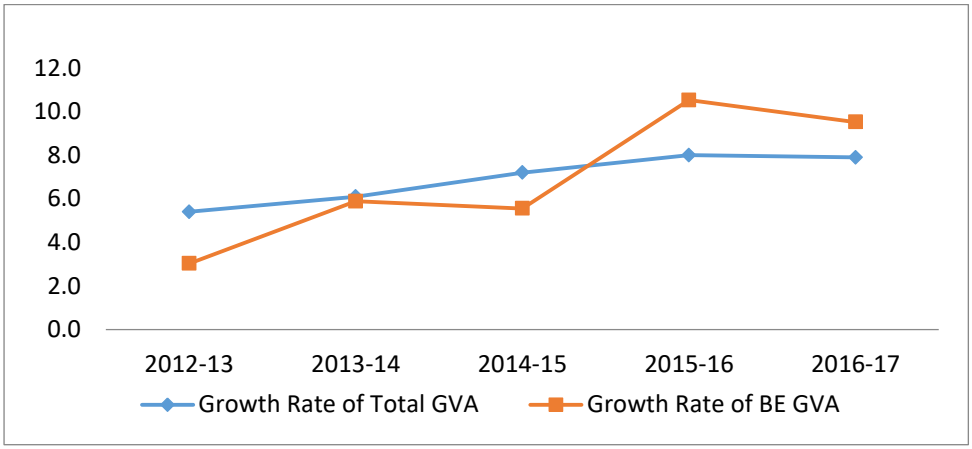

Figure 2: Growth Rate of total GVA Vs BE GVA

The figure suggests the rapid transformations, Blue economy sectors are bringing to India's economic growth and emphasizing on the need to ensure comprehensive strategy and implementation mechanism for both existing and new or emerging sectors. The sector wise share in blue economy is also significant and has increased subsequently; however the share of blue economy in the mining and quarrying has been the maximum (36%) in 2017, followed by agriculture, forestry and fishing (6%), Industry (5%) and services (2%).

The Report of Blue Economy Working Group on National Accounting Framework and Ocean Governance by the Economic Advisory Council to the Prime Minister of India provides a working definition of Blue Economy as - "Blue economy refers to exploring and optimizing the potential of the oceans and seas which are under India's legal

Blue Economy in India's Budget 2019-2020

- Framework for development, management and conservation of marine fishery resources and promotion of algae, sea weed and cage culture that will assist in raising fish production to 200 lakh tonnes by 2022-23.
- Government will involve youth in fishery extension through 3477 sagar mitras and 500 fish farmer producer organizations. She hopes to raise fishery export to rupees 1 lakh crore by 2024-25.

jurisdiction for socio-economic development while preserving the health of the oceans. The Blue Economy links production and consumption to capacity and envisages an integrated approach to economic development and environmental sustainability. It covers both the marine, that is offshore resources, as well as the coastal, that is onshore resources." According to the working group report the definition of "Blue Economy by India is comprehensive in the sense that it covers many dimensions of the ocean activities – a) occurrence of activities – activities in the coastal and off-shore region, b) within country's economic jurisdiction, c) integrated approach of blending development with sustainability, and d) all these activities keeping in view health of the oceans."

India's' working definition of blue economy goes beyond the economics and includes social, environmental and political aspects to the framework; this is reminiscent of its future pathway in blue economy. Blue economy has emerged as a major area of research, policy transformations and implementation pathways due to convergence of the ancient with the new. Ocean has remained as a silent contributor to global economies, with specific sectors remaining under the microscope such as shipping, offshore oil and gas and fisheries while missing the big picture. The UN's decision to announce the forthcoming decade as "Decade of Oceans" with the primary aim to build a science-policy interface is the right step towards capturing the magnitude of oceans and its role in our daily lives. The working definition provided by the working group is striving to move beyond the myopic view of oceans and there is an urgent need to understand the intrinsic value of healthy oceans for continuing customary/traditional sectors while exploring the future of emerging sectors.

This paper focuses on discussing the need for a healthy ocean for a healthy blue economy. It discusses the impacts of oceans on coastal communities, livelihoods and necessity to address sustainability concerns such as climate change and biodiversity. It discusses the role of oceans for ensuring food security, a key imperative for developing countries like India. The paper focuses on challenges and issues that are intrinsic to the Blue economy framework and need to be embedded in its discussions, strategies and implementation.

MAJOR LIVELIHOOD OPPORTUNITIES IN BLUE ECONOMY FRAMEWORK FOR INDIA

With around 4.1 per cent of the India's economic activities dependent on marine resources, the generation of livelihood from marine resources is significant. . All the ocean based economic activities like fisheries, coastal tourism, offshore oil and gas, shipbuilding and maritime equipment have been key economic contributors to employment and there is significant employment potential in marine aquaculture, capture fisheries, fish processing, offshore wind, and port based activities etc. as well (Ninawe 2019). Traditional sectors have driven the ocean economy with majority of people involved in these sectors emanating from coastal communities with vulnerable economic and social background. Fisheries sector in India largely comprises of such vulnerable population that lacks literacy and skill development.

With new emerging sectors such as deep sea mining and offshore energy among others, the milieu of people joining the ocean economy workforce would transform significantly. The new emerging sector requires a highly skilled workforce and the transitions in traditional sectors require a specific type of skilling as well. Creating a synergy between the two sectors to ensure that livelihood opportunities for both the skilled and unskilled labour are enhanced is imperative. Though one can emphasize that sectors such as fishing also require high skills, yet the current Indian population involved in sectors such as fishing and tourism require skill development and technological awareness to compete with their global counterparts.

India's EEZ is spread over 2.3 million sq. km., and Ministry of Earth Sciences (MoES) has already completed 1.5 million sq. km. of bathymetry survey, a compulsory scientific analysis, principally for mapping topographical features. Under the provisions of UNCLOS, India submitted its claim of six lakh km Continental Shelf beyond the limit of EEZ in May, 2009. Besides this claim, additional claim is under preparation for submission to UNCLOS in the domain of Extended-EEZ. This EEZ extension would be a significant milestone to ensure strategic presence, expand economic activities and sustainability. There is a need to understand that the expansion in India's EEZ would also open doors to more economic opportunities. A skilled and prepared workforce to tap its potential is necessary. The following section highlighting the livelihood opportunities is available in each sector and encapsulates possible ways to improve existing and new opportunities.

Marine Fishing

India is the third largest fish producing country and the second largest aquaculture fish producer in the world. India contributes about 7 per cent to the global fish production. The country is also home to more than 10 per cent of the global fish biodiversity and is one of the 17-mega biodiversity rich countries (NFDB 2020a). Further with the advancement of the fishing technology, the demand for fishery is increasing due to its dependence on food and livelihood. Fisheries are also a major aspect of blue economy as they provide food security and nutrition.

The fisheries sector provides livelihood to about 16 million fishers and fish farmers at the primary level and almost twice the number along the value chain (NFDB 2020b) and as envisioned by the government, the sector has immense potential to more than double the fishers and fish farmers' incomes. Out of the total livelihood opportunities provided at the primary level, it has been estimated that 32 per cent are in aquaculture, 49 per cent are in inland capture, 15 per cent in marine capture and 4 per cent in other including subsistence (FAO 2019) and women represent 32 per cent of the people employed in the sector. Besides these, fish processing industries also provide a major source of employment, especially to women in rural areas. The importance of fisheries as a sector was reiterated by the inclusion of the sector in India's budget for 2020.

Among the coastal states, Tamil Nadu, Odisha, Kerala, Karnataka, Andhra Pradesh and Gujarat are the most heavily dependent states on fisheries for employment as it is one of the oldest economic and largest activities for the coastal communities. Table 1 indicates the number of people dependent on fisheries for livelihood among these states.

Table 1: Population dependent on fisheries for livelihood among coastal states in India (in Numbers)

State	Fishing Villages	Fishermen Families	Fisherfolk Population
Andhra Pradesh	555 (16.2)	163,427 (18.7)	605,428 (14.9)
Gujarat	247 (7.2)	62,231 (7.1)	336,181 (8.3)
Tamil Nadu	573 (16.7)	192,697 (22.0)	802,912 (19.8)
Odisha	813 (23.7)	114,238 (13.1)	605,514 (14.9)
Karnataka	144 (4.2)	30,713 (3.5)	167,429 (4.1)
Kerala	222 (6.5)	118,937 (13.6)	610,165 (15.0)
Goa	39 (1.1)	2,189 (0.3)	10,545 (0.3)
Maharashtra	456 (13.3)	81,492 (9.3)	386,259 (9.5)
West Bengal	188 (5.5)	76,981 (8.8)	380,138 (9.4)

Source: Blue Economy Working Group Report, Economic Advisory Council to the Prime Minister 2020; Figures in bracket show the shares

Therefore the fisheries sector has been recognised as a powerful income and employment generator as it stimulates growth of a number of subsidiary industries and is a source of cheap and nutritious

food, at the same time it is an instrument of livelihood for a large section of economically backward population of the country (ASCI 2020).

India is working towards building a robust aquaculture sector. The budgetary provisions also focus on the sector and skill development. The National Inland Fisheries and Aquaculture Policy released in 2019, focuses on "development and management of all inland fishery resources including aquaculture in freshwater, brackish water and landlocked saline/alkaline areas. The policy adopts an Ecosystem Approach to Fisheries (EAF) management in its national and international instrument and policies.

The inland sector in India grew at a Compounded Annual Growth Rate (CAGR) of nearly 6% between 1979 and 2015, and overall fish production has registered an average annual growth rate of more than 7% in the past few years. This highlights the possibilities of further livelihood opportunities; however aquaculture requires significant investments in skill development and technological adoption. Both of these needs to be provided economic impetus to further the sector, on the other hand sustainable fishing technologies need to be introduced in capture fisheries as well to raise India' s competiveness in this area.

Port Shipping and ship breaking

India has a coastline of over 7,517 km, spanning into nine maritime States and two Union Territories (UTs) in the mainland, and two island UTs with 12 major and 200 non-major ports, which play a crucial role in sustaining growth of trade and commerce. The Indian shipping industry is thus an important indicator of both, commodity and services trade of the country. It plays an important role in the Indian economy, with around 95 per cent of India's trade by volume and 68 per cent in terms of value being transported by sea. Currently, India has one of the largest merchant shipping fleets among the developing countries and ranks 17th in the world (MoS 2020). The sector is thus one of the key livelihood providers in the blue economy. The number of Indian seafarers who are employed on Indian and foreign flag vessels crossed over 2 lakh personnel in 2018, showing an unprecedented increase of 35 per cent over the previous year (ibid.). Additionally, due to the government initiative in the sector, Sagarmala, it was claimed that over 10,000 jobs have been created and further the sector has the potential to generate nearly 40 lakh direct jobs and 60 lakh indirect employment opportunities over the next few years (MoS 2016). However, employment at 13 major ports of India has shown a 14% decline between 2003 and 2018. Unlike major ports, employment in non-major ports has increased over years. It has risen from 1,933 in 2003 to 19,102 in 2017 (Blue Economy Working Group Report 4). In the past five years, the non-major ports have edged the major ports in cargo volumes growth as well. The rise in employment and the role of non-major has increased because they tend to be at more strategic locations, with modernized infrastructure and more efficient in operations.

Table 2: Employment in major ports of India

Major Ports	2003	2008	2014	2016	2018
Kandla Port Trust	3929	4237	3299	2290	2586
Mumbai Port Trust	22217	14481	12017	9445	8629
Jawahar Lal Nehru Port Trust	1820	1763	1697	1615	1567
Mormugao Port Trust	3556	3018	2330	1954	1730
New Mangalore Port Trust	2220	1770	1332	947	808
Cochin Port Trust	4414	4306	2530	1899	1723
V.O. Chidambaranar	2963	2259	1646	1000	878
Chennai Port Trust	11172	9065	5991	4597	4336
Visakhapatnam Port Trust	6227	5069	4703	2880	2778
Paradip Port Trust	3513	2910	2015	1222	1007

Major Ports	2003	2008	2014	2016	2018
Kolkata Dock System	12621	9619	7181	3309	3016
Haldia Dock Complex	-	3694	2887	2193	1751
Total	**74669**	**58556**	**44843**	**33728**	**30914**

Source: Ministry of Shipping, Road Transport and Highways; Blue Economy Working Group Report, Economic Advisory Council to the Prime Minister 2020

According to the Indian Ship Registry, India has one of the largest ship breaking facilities in the world with 150 yards along its coast and around 6.2 Million GT is scrapped in India every year accounting for 33per cent of the total scrapped tonnage in the world. Recently, however, health and environmental concerns have led to adoption to new policy regimes at international level.

According to the Annual report of Ministry of Shipping, India is one of the world's five major ship recycling countries and in November 2019 ratified the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009 and has enacted the Recycling of Ships Act, 2019. The act ensures the enforcement of provisions of the Hong Kong Convention (HKC), while the Convention is yet to come in force. As the treaty sets strict standards, India hopes to lure business from entities who will comply with International standards. India was the largest ship breaker until due to price variation Bangladesh took the coveted number one spot. A key aspect of this Industry is the cheap labour available in developing countries such as India, Bangladesh and China that makes it lucrative for all sectors to approach these countries for ship recycling. The downside of this sector is the life threatening risk for laborers and unsanitary conditions. The new law envisions to address these conditions through effective monitoring and compliance to green standards. However, the International Labour Organisation considers a job in the sector as one of the most dangerous in the world. According to the NGO Ship breaking platform, around 35,000 people are directly employed in the sector with another 23,000 people employed in downstream industries such as Re-Rolling Mills, Industrial gases, scrap processing and sundry traders.

Marine and Coastal Tourism

Tourism is one of the fastest growing sectors of not just the global but Indian economy as well, which has multiple forward and backward linkages by way of infrastructure, transport, 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. According to the United Nations World Tourism Organization (UNWTO), the sector supported 313 million jobs, almost 10 per cent of the total global jobs in 2017 (KAS 2019). The travel & tourism sector in India accounted for 9.3 per cent of the total employment opportunities generated in the country in 2016, providing employment to around 40.3 million people during the same year (WTTC 2017). Developing and encouraging coastal and marine tourism is also receiving massive impetus from the centre and the states. Important initiatives like promoting cruise tourism by developing special port facilities at Mumbai, Goa, Cochin and Chennai for both domestic and international cruises; creation of 'Special Tourism Zones' and Ministry of Tourism's initiative, Swadesh Darshan Scheme are aimed at promoting beach and coastal tourism. Recently, India's eight beaches across five states and two UTs have been awarded the prestigious 'Blue Flag' certification also. 'Blue Flag' is one of the world's most recognised voluntary awards for beaches, marinas, and sustainable boating tourism operators and it is a representation of India's conservation and sustainable development efforts in the coastal regions.

Particularly in coastal states like Kerala, Karnataka and Tamil Nadu, coastal tourism has contributed largely to both the state economies and livelihood creation. According to the ministry of tourism, the total number of jobs created directly and indirectly by the sector between 2009 and 2012 turned out to be around 23.52 per cent of the total employment in Kerala (SPBK 2016). The total share of

tourism in Tamil Nadu's employment was more than 22 per cent in 2016 and 23 per cent in Karnataka's (MoF 2020).

In the current COVID scenario, tourism sector has been the most affected sector. According to CARE ratings, India would witness a revenue loss of Rs 1.25 trillion in 2020, a 40 per cent decline in revenue for the calendar year 2019.[1] According to KPMG study, Indian tourism sector would be facing potential job loss of around 38 million, approximately 70 per cent of the total workforce facing unemployment.[2] As a labour intensive industry, the sector needs to reinvent the wheel to safeguard jobs and ensure steady generation of revenues for survival and continuity. States such as Kerala and Karnataka are re-strategizing to lure local and domestic tourists with focus on single or small group of tourists with interest in adventure and eco-tourism. Since the phase out of lockdown, many coastal destinations across the country have witnessed a slow surge in travellers who backpack or travel alone. This increasing trend should be leveraged for to ensure livelihoods.

Energy Infrastructure

Providing electricity from cleaner energy fuels is one of the important aspects when it is discussed about sustainable development and blue economy is an emerging large reservoir of such energy. The ever-increasing demand for energy for the purposes of household and industrial consumption in most parts of the world especially in India and other emerging markets necessitates alternative sources of energy, most importantly the renewable energy. Offshore regions have tremendous potential to provide renewable energy, viz. offshore wind, waves, ocean currents including tidal currents and thermal energy. About 350GW of offshore wind energy is estimated within the EEZ of India (Atmanand et al. 2019). In terms of employment as well, the offshore segment is gaining traction and could build on expertise and infrastructure in the offshore oil and gas sector (IRENA 2019). A total of 0.7 million people were employed both directly and indirectly in the renewable energy sector in 2018, out of which around 48 per cent are in the hydropower and 8 per cent are in the wind energy, however no clear estimates are available for the tidal or wave or ocean energy (ibid.).

Other than the above sub-categories, marine biology and biotechnology are also providing significant revenue generation to the Indian economy. India has projected revenue generation of USD 100 million by 2025 through biological and bio-technology industrial growth and therefore there appears to be enormous potential for livelihood opportunities as well. Many opportunities also exist for entrepreneurs that may harness the potential of ocean-based industries for promotion of bio-businesses in India.

The world is looking towards oceans for myriad of new emerging sectors and opportunities; however the success of traditional and new sectors would solely depend on oceans' health and long term sustainability of its fragile ecosystems. All sectors depend on the ecology of oceans to thrive and accrue their benefits from it, yet the consideration for its environment and ecosystem lacks attention.

The various targets of SDG14 also ensure that sustainable livelihoods is maintained in the blue economy as activities like overfishing, unmanaged aquaculture and even rising pollution levels threaten the livelihoods of the people dependent on these sectors. About 30 per cent of world's fish

[1] https://www.business-standard.com/article/economy-policy/covid-19-impact-tourism-industry-to-incur-rs-1-25-trn-revenue-loss-in-2020-120042801287_1.html

[2] https://www.thehindu.com/news/national/kerala/coronavirus-tourism-sector-stares-at-70-job-loss/article31310234.ece

are stocks overfished, producing catches lower than their biological potential; 60 per cent are fully exploited, with catches at maximum sustainable production and 10 per cent under-fished. The main causes of overfishing include limited or ineffective harvest regulations; overcapacity of the fleets; destructive fishing practices, as well as illegal, unreported and unregulated fishing (IUU). Illegal, Unregulated and Unreported (IUU) fishing contributes greatly to the problem of overfishing. IUU fishing is done by 5-9 per cent of the total fishing crafts operating along India's maritime zone which leads to problems in misreported catches and thus in assessing the sustainability.

Since blue economy is also a major contributor of tourism, thus promoting full and productive and decent employment for all is also one of the major targets of the sector along with promoting local culture and products which are closely related to the SDG8 and 12 and specifically targets 8.9 and 12.b that ensure sustainable tourism.

Biodiversity and its significance for healthy economy

Coastal and Marine ecosystems are some of the most productive areas on Earth and are home to a wealth of biodiversity. The coastal zones play a vital role in the nation's economy in terms of their resources, productive habitats and rich biodiversity. India, being a tropical country with a coast line of 7,500 km and over 1,200 islands located on either side of mainland, is rich in biodiversity with a wide range of flora and fauna. The total Exclusive Economic Zone (EEZ) of India as per UNCLOS covers an area of 2,305,143 square kilometers. It is endowed with rich environmental resources, biodiversity and productive habitats. Even though Indian Ocean is a hotspot of marine biodiversity, the full potential is not yet realized and has been declining in biodiversity, habitat destruction and climate change impacts. India has a large number of coastal and marine ecosystems such as estuaries, coral reefs, salt marshes, lagoons, sandy and rocky beaches, backwaters, mangrove forests and sea grass beds that support a wealth of national and globally significant biodiversity. Coral reefs are major storehouses for biodiversity, providing habitat for at least 1 million species of marine animals and plants despite covering only a tiny fraction of the ocean floor therefore conservation measures are important to preserve the coral reef biodiversity. Coral reef ecosystems in India are found in the Gulf of Kutch, Gulf of Mannar, Andaman and Nicobar Islands, and the Lakshadweep Islands with a reported area of 1270 km2. The Indian Sundarbans inter-tidal delta (constituted about 40per cent of the world largest mangrove forest and rest is in Bangladesh) also harbours a luxuriant biodiversity and acts as a potential refuge of living marine resources. It offers an excellent nursery ground for most of the brackish water finfish and shellfish diversity.

Biodiversity Hotspots in India

- India is one of the 12 mega-biodiversity countries and 25 hotspots of the richest and highly endangered eco-regions of the world.
- Highest diversity of corals being recorded in Andaman and Nicobar islands. Around, 208 species of hard corals belonging to 60 genera have been so far described of which at least 6 are endemic to India.
- India is estimated to have 6700 square km area under mangroves, which is 7% of world's mangrove area Five of the seven species of sea turtles found worldwide are reported to occur in Indian coastal waters
- Five of the seven species of sea turtles found worldwide are reported to occur in Indian coastal waters

The loss of marine biodiversity is weakening the ocean ecosystem and its ability to withstand disturbances. The health of the oceans is strongly dependent upon this marine biodiversity and therefore requires special attention on the depletion of fish stocks, conservation of marine biodiversity, ocean acidification, and destruction of habitats and occurrence of alien invasive species. There is a lack of knowledge about biodiversity and ecosystem functioning and the importance of

Ecosystem Services and an increasing acknowledgement of the detrimental effects that human populations have on marine and coastal ecosystems.

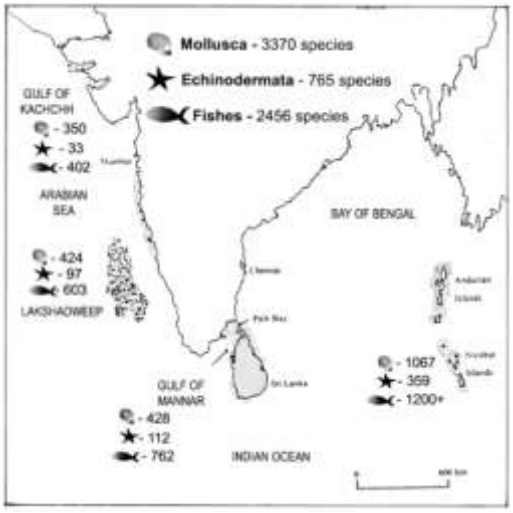

Figure 3: Diversity of Mollusca, Echinodermata and marine fishes in India. (Venkataraman & Wafar, 2005)

To mitigate these threats, policy managers have started to implement various ecosystems management tools, which are recognised by the Convention on Biological Diversity (CBD). Currently, the Aichi Targets are one of the major sets of conservation standards. The United Nations Sustainable Development Goal (SDG) 14 to "conserve and sustainably use the oceans, seas and marine resources for sustainable development" reaffirms the quantitative element of Aichi target 11 (to conserve at least 10 per cent of coastal and marine areas (SDG sub-target 14.5) and, through the described sub-targets, places further emphasis on the economic and social context of global development. The SDGs are intended to address sustainable development processes and to facilitate action with all actors, including government, civil society, the private sector and the science community to strengthen the capacity of the State to achieve the desired outcomes, the most popular being Marine Protected Areas (MPAs).

MPA's in India

- India has 25 Marine Protected Areas covering 6200 km2 in peninsular India and 106 Island Marine Protected Area covering 1569.63 km2 in islands form part of PAS.
- India has identified 12 areas as trans-boundary protected areas under the framework of the IUCN Trans-Boundary protected area programme.
- Has six designated UNESCO World Heritage sites of which Sundarbans National Park is one

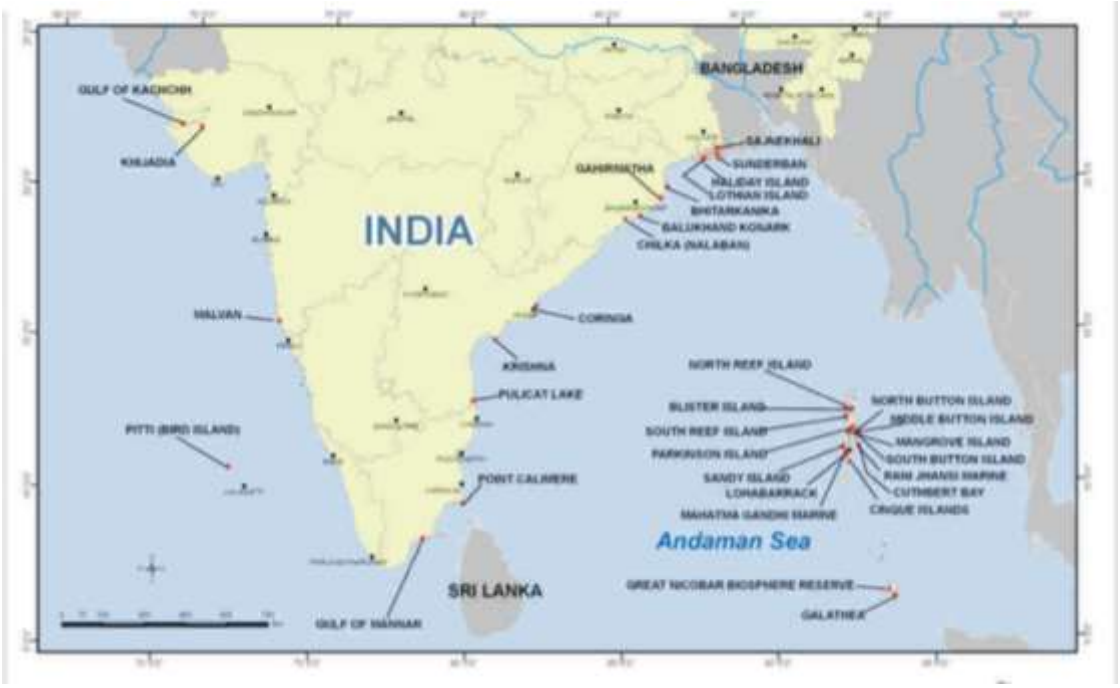

Figure 4:Important coastal and marine protected areas of India(Sivakumar, K.2014)

The Blue Economy is a tool of sustainable development that looks to marine resources to provide new economic opportunities, as well as poverty alleviation, food security, and sustainable livelihoods through which multiple Sustainable Development Goals (SDGs) can be advanced. It looks at the larger ocean jurisdictions for new sources of economic opportunities. It has now being employed in most of the regions and has been in a range of integrated maritime governance approaches, such as marine spatial planning, integrated coastal zone management, and regional marine planning.

Biodiversity for economic growth

Ensuring healthy oceans is vital for achieving sustainable development; the impacts of current human induced pressures are compromising the ability of the oceans to deliver economic, social and environmental benefits. These key pressures include over-fishing and over-exploitation of marine resources, pollution, invasive alien species, habitat destruction and climate change. For instance, 85 per cent of the world's fisheries are fully exploited, overexploited, or depleted. Marine pollution mainly results from direct discharge, land run-off, ship pollution, atmospheric pollution and deep sea mining. Marine litter in our oceans is made of 80 per cent plastic. By 2050, it is estimated that oceans will carry more plastic than fish and that almost every seabird will have ingested plastic. Marine pollution moves marine species which can impact marine industries and human health and around 7,000 marine species are carried around the world in ballast water every day and 232 marine eco-regions have invasive alien species.

With the absorption of the carbon dioxide from the atmosphere, the oceans are becoming increasingly acidic at a rate that is 10 times faster accelerating climate change. The

Achievement of Aichi Biodiversity Targets 11

- ***India is among the first five countries in the world, the first in Asia and the first among the biodiversity-rich megadiverse countries to have submitted the Sixth National Report to the Convention on Biological Diversity (CBD).***
- According to the report, India has exceeded the terrestrial component of 17% of Aichi target 11, and 20% of corresponding NBT relating to areas under biodiversity management. There is very slow progress, and is not sufficient to achieve the elements of target 11 (to conserve at least 10 per cent of coastal and marine areas by the target date of 2020.

climatic changes in the ocean also significantly impact landlocked areas that depend on seasonal winds, precipitation and formation of snow for maintaining temperature and water resources. Mainstreaming biodiversity into the plans, strategies, and policies of different economic sectors is key to reversing these declines, that emphasize the importance of global biodiversity for human well-being and ocean health. Recently, MPAs have been described as one of the main means to achieve marine conservation targets. They provide both direct and indirect benefits for nature and humans, such as replenishing fisheries stocks, along with biodiversity, education, research, culture and economic value. There are 15,604 estimated MPAs around the world with the largest five representing more than 50% of all the protected ocean (UNEP-WCMC, 2018). These were all designated between 2000 and 2012 and largely in the Pacific Ocean, however, at present only about 6.97% of the global ocean is protected, accounting for 25 million square km (UNEPWCMC, 2018).

MPAs are still in the first stage of development and are partially protected allowing extractive activities to occur at differing degrees. Many of these MPAs still lack effective management and proper conservation measures to provide effective biodiversity protection

The concept of blue economy is becoming increasingly evident in India based on straddling principles of marine-led economic growth, protection of marine environment, and enhanced maritime security in all national and regional manifestations.' they provide us with essential development ecosystem services, such as coastal protection from storms and nursery grounds for fish.

Biodiversity Strategies and Action Plans (NBSAPs), which support the mainstreaming of biodiversity into the policies of key economic sectors, such as agriculture, forestry and fisheries is important. Ten per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measure It has gained importance in India's strategic and development vision. The economic importance of biodiversity has been measured by economic valuation techniques (Pearce and Moran, 1994; Nunes et al.,2003; Turpie, 2003; TEEB, 2008), which are based upon the identification and determination of the values and the benefits that biodiversity provides for the welfare of humans and the healthy function of ecosystem. Within the blue economy purview, India has an opportunity to accentuate it Marine Spatial Planning and utilise biodiversity focuses eco-system services to generate income, involve communities in the management for biodiverse zones. Such implementation mechanisms would serve a dual purpose of ensuring livelihoods and preserving biodiversity.

The Indian Ocean plays a vital role in the economy through a significant contribution in livelihoods, cultural identities, fisheries, offshore oil and natural gas resources, tourism and maritime industries. New opportunities exist in established sectors of capture and exploitative resource industries, hence, there is a need for sustainable development by sharing of skills, knowledge and governance for commercialisation and industrial growth. Based on its enormous potential, the blue economy concept has been well elaborated for expansion in the Indian Ocean driven by the Indian Ocean Rim Association (IORA) and individual countries including Seychelles, Mauritius, India and Australia. As a key figure in the IORA, India could rally other countries to strengthen biodiversity measures to ensure long term protection of the Regional Ocean and livelihoods dependent on it.

OCEAN AS A PROVIDER- FOOD SECURITY

Global Fish production peaked at about 171 million tonnes in 2016 with 47 percent emanating from aquaculture. Capture fishery production has largely remained static since late 1980s. 85 per cent of

global population involved in fisheries and aquaculture was in Asia and 75 per cent of global fishing vessels are from the region as well. According to FAO 2018, the percentage of stocks fished at biologically sustainable levels have increased from 10 per cent in 1974 to 33 percent in 2015- with most of the increase emanating in the 1970 and 1980s. Fisheries is also a major contributor to Food security, as global food fish consumption has grown from 9.0 kg in 1961 to 20.2 kg in 2015 (in per capita terms) with Asia emerging as the largest consumer in 2015 (FAO 2018).

India would need 18 million metric tons of fish production by 2030 to meet its domestic demand, however the current production from capture fisheries will not be sufficient to address this challenge. Hence, a concerted effort to promote aquaculture is required to fill the gap while addressing the capture fisheries challenges such as over capacity of fishing fleets, marine pollution, and climate change and habitat destruction among others. A major challenge highlighted in the Working Group Report 3 on Fisheries and Aquaculture by the Economic Advisory Council for Prime Minister of India is to address Illegal, Unregulated, Unreported (IUU) fishing which is being carried out by 5- 9% of the total fishing crafts, operating along India's maritime zone.

It is well known fact that significant share of coastal population in India is below poverty line. Around 0.865 million fishermen households were part of the 2010 census out of which 91 percent were involved in traditional or artisanal fishing. Along the coast, 90% of the fisherfolk were involved in artisanal fishing, only few states such as Odisha and West recorded lesser ratio. At the national level, 61 percent of the censuses fisherfolk were in the BPL category in 2010 (Syda et al 2016). According to the Report Future of Food from the Sea, Fish production is also intrinsically linked to nutritional security. Fish accounts for about 20 percent of animal protein and 6.7 percent of all protein consumed by humans globally. The consumption of fish and the accrued protein levels increase to upto 50% in the food consumption of many coastal nations. Nearly 500 million metric tons (mmt) of protein will be required to feed the global population in 2050 (FAO 2018, 2009). According to the Panel report, food from the oceans also promotes sustainability that proteins from the sea emits lower green house gases and does not require significant amount feed input. The report further notes that in contrast to land based production, constraints of land requirement and water is limited for ocean based food, additionally, the nutritional content in food from the oceans is significantly higher than land based protein. It also emphasizes that coastal communities have higher and easier accessibility to the oceans specifically for coastal population is higher. While much of what the report has highlighted is valid, however with increasing aquaculture in India- the role of land and water availability will come into question in the Indian context and accessibility of coastal population to the ocean food source is definitely easier, however further analyses is required to understand if traditional fishing practices are providing the right nutrition and sufficient quantities of fish or ocean based protein to the coastal communities in India.

India is still long way from undertaking high-end fishing techniques. Deep sea fishing requires significant capital investment, hence hasn't seen a surge in the Indian sub-continent. Besides Mari culture of high value species is being explored in India- however, this requires skills, technology and high investment a well.

HEALTHY OCEANS AND CLIMATE CHANGE

The Blue Economy embodies economic, social, and environmental benefits, which demonstrate the Sustainable Development Goals (SDGs), and is hence also considered to be an alternate model for development. The Blue Economy thus takes into account those activities that explore, develop, and

utilize ocean resources, that use the space within the oceans, and protect its ecosystems. It includes traditional industries as well as new and developing industries (Steven et al, 2019).

Oceans and coastal ecosystems provide essential services, such as fisheries, tourism, and coastal protection, which are socially and culturally vital to the communities that inhabit the coast. However, the oceans are getting adversely impacted by the changing climate, which would result in significant negative effects on coastal economy and the benefits and vital services provided by nature. There is an urgent to take necessary steps towards enhanced conservation by mitigation and counteraction of the repercussions of climate change.

Sea level rise and acidification

Climate projections made by the Intergovernmental Panel on Climate Change (IPCC) indicate that the sea level is expected to rise by 11 – 88 cm by the year 2100. Among the many impacts of sea level rise are the adverse effects that warmer temperatures will have on the world's fisheries and coral reefs (Patz et al, 2006). It is predicted that the productivity of fisheries will decline due to warming of the oceans and lowered dissolved oxygen, lowered levels of nutrients at the ocean surface and reduced phytoplankton biomass, shifts in range and species abundance patterns, and ocean acidification, changes in salinity structure, and changes in upwelling (Jewett and Romanou, 2017; Patz et al, 2006). These changes may lead to alteration of developmental times, and create mismatches between the developmental stages of fish species and food sources, along with reduced body size (Roberts et al, 2017). The slowing of the North Atlantic Gulf Stream may have an effect on the abundance and seasonal availability of the plankton that serve as a principal source of food for many fish larvae. The declining populations of fish larvae will negatively impact the capacity for recovery of overexploited fish stocks (Patz et al, 2006).

Since pre-industrial times, the oceans has absorbed a third of the human emissions of CO2, causing the surface ocean layers to become an average of 26% more acidic. If this trend continues, the business-as-usual scenario indicates that acidity will increase by 100% or higher by the year 2100. Acidification of the oceans is also raising concern due to increased stress on marine life and the heightened damage that would be caused to corals and other reef building taxa, and hard shelled organisms resulting from the decreased availability of calcium carbonate from sea water (Patz et al, 2006; Roberts et al, 2017). It has been observed by Patz et al in 2006 that some models indicate that a mean increase in sea surface temperature of just 1°C could lead to the collapse of coral reef ecosystems the world over. Morrison et al in 2020 have observed that the thus far increase in the average global warming by 1% has caused a reported 94% of coral reefs worldwide to undergo one or more instances of severe bleaching since the 1980s.

Warm water and increased nitrogen levels can encourage the formation of red tides or harmful algal blooms (HABs), which in turn can cause die-offs on the large scale of fish and of marine mammals and birds that are dependent on the marine food web. Increased sea surface temperatures and upwelling events are also linked with the formation of HABs and associated shellfish and fish poisoning (Patz et al, 2006).

The rankings of ocean industries in terms of the economic outputs of production value and employment are different: production values are dominated by energy production, shipping, and tourism, while nearly 50% of ocean employment arises from food production. Therefore, the impacts of climate change on these industries can produce distinct social and economic consequences. Climate change will produce significant effects on the blue economy sectors, some of which are outlined below (Gaines et al, 2019):

- Due to climate change, there is significant alteration in the capacity for marine fisheries to provide food and income to people worldwide. It is commonly opined that this is occurring due to the imapcts on the distribution of fish stocks or their productivity.
- Mariculture production will also be affected by climate change by its impacts on the cultivated organisms and the costs and infrastructure of conducting such operations. A significant degree of infrastructure is required for cultivating marine species, which would be vulnerable to the increased frequency and intensity of storms and poor environmental conditions. This would increase the costs to farmers and disproportionately impact those who are unable to relocate. The impacts would vary depending on location, species and methods of production
- Marine tourism will also be impacted by climate change as it will adversely affect optimal weather conditions and the attractiveness and uniqueness of the coastal environment. This will occur due to the repercussions of climate change on the physical and ecological resources on which tourism depends.

The effects of the type of change, including the climate variable and its impacts, and the potential outcome for fisheries on which a large proportion of coastal populations depend, is described in the Figures and table below

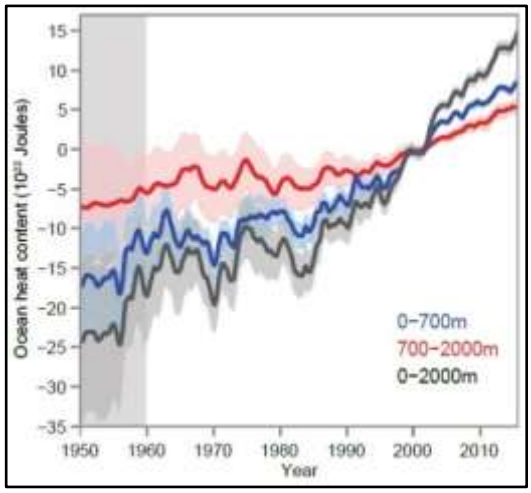

Figure 5: Global Ocean heat content change time series. Ocean heat content from 0 to 700 m (blue), 700 to 2,000 m (red), and 0 to 2,000 m (dark gray) from 1955 to 2015 with an uncertainty interval of ±2 standard deviations shown in shading. Time series of the analyses is relative to the 1997–2005 base period (Source: Jewett and Romanou, 2017).

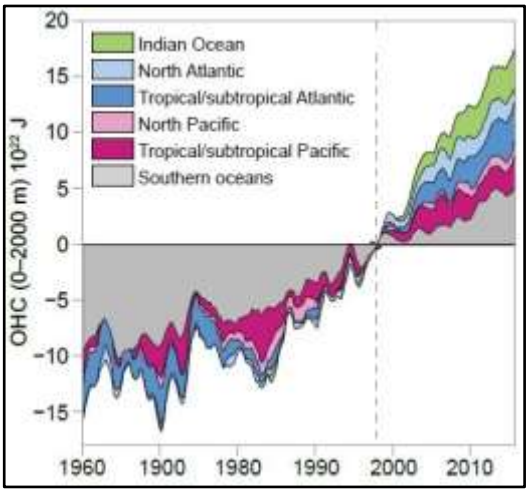

Figure 6: Global Ocean heat content change time series. Ocean heat content from 0 to 700 m (blue), 700 to 2,000 m (red), and 0 to 2,000 m (dark gray) from 1955 to 2015 with an uncertainty interval of ±2 standard deviations shown in shading. Time series of the analyses is relative to the 1997–2005 base period (Source: Jewett and Romanou, 2017).

	% OF PRODUCTION VALUE	% OF EMPLOYMENT
1. Offshore oil and gas	34	6
2. Marine and coastal tourism	26	22
3. Port activities	13	5
4. Maritime equipment	11	7
5. Fisheries, marine aquaculture and fish processing	6	49
6. Ocean transportation	5	4
7. Shipbuilding and repair	4	6
8. Offshore wind	1	1

Table 3: Ocean Industries contributing most to the ocean economy (Data from 2010). (Source: Gaines et al, 2019).

Table 4: Correlation of the type of change and the climate variables and their impacts with the potential outcomes for global fisheries

Types of Change	Climate Variable	Impacts	Potential Outcomes for Fisheries
Physical environment	Ocean acidification	Negative effects on calciferous animals, including slowed rate of coral growth	Declines in production
	Warming of upper ocean layers	Poleward shifts in plankton and fish species	Changes in production and availability of fished species
		Changes in timing of phytoplankton blooms	Potential mismatch between prey (plankton) and predator (fish species) and declines in production
		Changing zooplankton composition	
	Sea level rise	Loss of coastal habitats	Reduced production of coastal marine and freshwater systems and related fisheries
		Saline intrusion into freshwater habitats	
Fish stocks	Higher water temperatures	Changes in physiology and sex ratio of fished species	Changes in timing and levels of productivity across marine and freshwater systems
		Altered timing of spawning, migrations, and/or peak abundance	
		Increased invasive species, diseases, and algal blooms	Reduced production of target species in marine and freshwater systems
Ecosystems	Reduced water flows and increased droughts	Changes in lake water levels	Reduced lake productivity
		Changes in dry water flows in rivers	Reduced river productivity
	Increased frequency of ENSO events	Changes in timing and latitude of upwelling	Changes in pelagic fisheries distribution
	Higher water temperatures	Increased frequency and severity of	Reduced coral reef fisheries

Types of Change	Climate Variable	Impacts	Potential Outcomes for Fisheries
		coral bleaching events	productivity
		Changes in stratification, mixing, and nutrients in lakes and marine upwellings	Changes in productivity
Coastal infrastructure and fishing operations	Sea level rise	Coastal profile changes, loss of harbours and homes	Costs of adaptation make fishing less profitable, increased costs of insurance and/ore rebuilding, increased vulnerability of coastal households
		Increased exposure of coastal areas to storm damage	
	Increased frequency of storms	Fewer days at sea, increased risk of accidents	Reduced viability of fishing and fish-farming as livelihood options for the poor, reduced profitability of larger-scale enterprises, increased costs of insurance
		Aquaculture installations (coastal ponds, sea cages) at greater risk of damage	
Inland fishing operations and livelihoods	Changing levels of precipitation	Where rainfall decreases, reduced opportunities for farming, fishing, and aquaculture as part of rural livelihood systems	Reduced diversity of rural livelihoods; increased risk in agriculture; greater reliance on non-farm income
	More droughts or floods	Damage to productive assets (fish ponds, weirs, rice fields, etc.) and homes	Increased vulnerability of riparian and floodplain households and communities
	Less predictable wet/dry seasons	Decreased ability to plan seasonal livelihood activities	

Source: Allison et al, 2009.

Blue Carbon Habitats

The flora of coastal wetlands, including, mangroves, sea grasses, and salt marshes, comprises plants with high rates of photosynthesis, which engineer reductions in CO_2 concentrations at the localized level, thus raising the pH of the surrounding water and, in this manner, provide refugia in the day time to vulnerable calcifying organisms (Allison and Bassett, 2015; Roberts et al, 2017). Blue carbon is organic carbon that is captured and sequestered by coastal marine plants, especially wetlands. Being highly productive, these habitats exhibit extremely high rates of carbon burial, at levels that can be much greater than that exhibited by terrestrial ecosystems. If left undisturbed, the oceanic buried carbon remains sequestered for much longer (Steven et al, 2019). Organic carbon is stored by coastal wetlands in underlying sediments for millennia, a factor that accounts for almost 50% of carbon stored in ocean sediments in spite of covering less than 1% of ocean area. Since wetlands hold among the largest stocks of organic carbon in the biosphere, the smallest disturbances can affect carbon fluxes and the clearance of wetland flora can encourage the loss of stored carbon (Allison and Bassett, 2015; Roberts et al, 2017). As mangroves are reservoirs of carbon, their destruction can release the stored carbon back into the atmosphere, thus exacerbating global warming and furthering climate change. Based on estimated costs of the products and services provided by mangroves, their annual economic value is placed between USD 200,000 – 900,000 ha^{-1} (Gilman et al, 2008).

Important regional and site-specific functions are fulfilled by coastal wetlands, including mangrove ecosystems. The loss of mangroves due to the changing climate will reduce the quality of coastal waters, reduce biodiversity, wipe out the nursery habitats of fish and crustacean species, negatively affect the adjacent coastal habitats, and remove a primary resource for those human communities that are dependent on the mangroves for various products and services. The increase in intensity and frequency of storms caused due to climate change can potentially increase damage to mangroves via defoliation and tree mortality, stress, and sulphide soil toxicity, and other adverse factors (Gilman et al, 2008).

Changes in patterns of precipitation, causing decreased precipitation and increased evaporation in most sub-tropical regions, would also adversely affect mangroves by increasing salinity, thereby decreasing net primary productivity, and the growth and survival of seedlings. The competition between mangrove species would also be altered, thus decreasing their diversity and causing a significant reduction in their cover area due to the conversion of upper tidal zones to hypersaline mud flats. Increased precipitation, which would be highly probable in the higher latitudes, would result in increased rates of growth and diversity, with increased cover arising from colonization of previously non vegetated areas within the tidal wetland zone towards the landward edges (Gilman et al, 2008).

It is presumable that biological communities have the ability to evolve and adapt as a response to gradual change. However, Patz et al (2006) point out that a clear-cut picture does not exist to indicate that adaptation can occur satisfactorily when such communities are faced with the impacts of the doubling or higher concentrations of atmospheric CO2 in the 21st century.

Blue Flag ecolabel for beaches and marinas

Ecolabelling is a method for voluntary certification of environmental performance that is practiced globally. An ecolabel identifies, on the whole, demonstrated environmental preference of a product or service within a given category. Ecolabels thus form a means of measuring sustainability and indicate that the products thus labeled meet predetermined standards. The labels are awarded by an unprejudiced third party in relation to given products or services that are autonomously established to meet transparent criteria for environmental leadership (Akhter and Darzi, 2013).

The Blue Flag is a voluntary ecolabel that is conferred to beaches and marinas across the world. Conforming to the Blue Flag criteria necessitates the compliance to given standards for water quality, environmental education and information, general environmental management, and safety and provision of services. In addition to the compliance to standards for bathing water of excellent quality, industrial effluent discharge is prohibited due to direct and indirect effects on the beach area. It is also a strict requirement that the health of coral reefs and vegetation within the locality of the beach be monitored on a regular basis. A committee for beach management is also established that is given charge of creating systems for environmental management and conducting environmental audits on a regular basis (Akhter and Darzi, 2013; FEE, 2006). Thus, the Blue Flag certification encourages sustainability and awareness in the public, tourism, and business scenarios in the context of beaches and marinas, while being overseen and supervised by an unbiased third party.

It has been recently reported that 8 beaches in India were awarded the Blue Flag certification in October 2020, these being: Shivrajpur (Dwarka, Gujarat), Ghoghla (Diu), Kasarkod and Padubidri (Karnataka), Kappad (Kerala), Rushikonda (Andhra Pradesh), Golden (Puri, Odisha) and Radhanagar (Andaman & Nicobar Islands) (India Today, 2020). It was, however, reported in 2019 by the Deccan Herald newspaper that erosion activities have continued to cause destruction at Padubidri beach, Karnataka. According to the locals living in the region, the mangroves at Nadipatna in Padubidri were cleared as a means of beautifying the beach as part of the Blue Flag beach project (Deccan Herald, 2019).

Marine reserves as a tool to mitigate and promote adaptation to climate change

With the emissions of greenhouse gases (GHGs) and their impacts accelerating, Roberts et al (2017) are of the opinion that even the Paris Agreement, that resolved an extreme emissions reduction trajectory to limit global warming to 1.5°C by the year 2100, will not deflect grave stress and damage to life on Earth. Scientific projections generally indicate that the effects of global warming will continue to intensify for at least another five decades before the effects of emissions reduction may be obvious. These heightened impacts will have notable consequences for wildlife and will place many of the benefits received from the environment at risk. Therefore, apart from taking aggressive measures to reducing GHGs, it is urgent to enhance ecosystem resilience, preserve their wildlife, and secure their ability to provide essential goods and services. Roberts et al (2017) suggest that this may be achieved by the highly practical and cost-effective strategy of creating marine protected areas (MPAs). In conjunction with strong fisheries management practices outside them, MPAs have effectively served, as a nature based tool, for repairing damage to habitats and overexploited fish stocks and for biodiversity conservation. However, the benefits accrued from an MPA are greatly dependent on the efficacy of implementation and management, and in particular, to the level of protection accorded to it, and thus a marine reserve produces the highest conservation benefits (Roberts et al, 2017).

Protection of wetlands is a principal aim of many marine reserves, the establishment of which has protected these ecosystems from human activities that would adversely impact them, such as coastal development and conversion to aquaculture (Allison and Bassett, 2015; Roberts et al, 2017). Safeguarding these ecosystems from threats such as overharvesting of fish, dredging, and coastal development helps in protecting their function as coastal defenses. The elevation of mangroves is also known to increase over time, and may be able to keep step with predicted sea level rise. Warmer oceans are also expected to create more intense storm systems that have a wider latitudinal coverage and protected coastal ecosystems reduce the risks posed by storms and coastal flooding, offering a solution that is more cost-effective than restoration of habitats or geo-engineering solutions (Roberts et al, 2017).

Teleost fish populations are significant in the marine inorganic carbon cycle as they ingest seawater for osmoregulation and excrete all the ingested calcium and some ingested magnesium as high-magnesium calcite crystals. Such fish carbonates dissolve at shallower depths than similar products from marine calcifers, and, as a result, have a more immediate impact on surface pH and buffering of seawater, thus serving as the first line of defense against the negative environmental conditions produced by acidification. Similarly, mesopelagic fish, the most plentiful vertebrates on Earth, are notable in the active flux of organic carbon from the ocean surface to the deep sea. The scenario of their wide, daily, vertical migrations, in which their gut carbonates that are produced at lower depths get released at shallower depths, is potentially of importance in contributing to the net removal of CO_2 and the addition of HCO_3^- to the ocean surface. Marine reserves would help maintain this fish biomass and propagate the role of such species in the marine biogeochemical cycles (Roberts et al, 2017). Marine reserves, by providing a strategic refuge and suitable habitat, are able to increase reproductive output, thereby increasing dispersal distances that are ecologically meaningful, improving connectivity between populations, while concurrently reducing the risk of populations getting destroyed, increasing resilience to stress, and also supporting populations found outside the boundaries of the reserve (Roberts et al, 2017). The emigration of juveniles and adults emerging from reserves as spillovers is typically found to extend for several kilometres, and eggs and larvae can be exported over tens to more than a hundred kilometres. Appropriate levels of protection afforded to coastal wetland nurseries can ease and assist the completion of the life cycles of species that require multiple habitats, and enhance fisheries in this manner. The outcomes would be increased food security and prosperity for mankind, and may have the effect of offsetting predicted declines in the productivity of oceans and fisheries.

Marine reserves are known to provide economic benefits through tourism activities such as diving, snorkeling, and glass-bottom boats due to the increased abundance of marine life, and fishing due to an increase or stablisation of fish catch around the reserve. Economic benefits are also provided by other services, some of which are not easily quantifiable, such as insurance value, local amenity value, storm protection, political value, intangible capital. The increased species diversity in marine reserves was found, upon analysis, to be associated with heightened increases in productivity of fisheries and a reduced variability of aggregate fish biomass, and an increase in the resistance and recovery following natural disturbances from storms and thermal stress. The amenity value of the marine resources that are protected in the reserves is recurrently greater than the commodity value of the resources. Additionally, other non-commodified goods and services are also provided by marine ecosystems that can be appreciated by marine reserves. Examples of the economic benefits of marine reserves are given in the table 5 below (Sala et al, 2013).

Table 5: Examples of the economic benefits gained from marine reserves through the enhancement of fisheries and tourism 9Source: Sala et al, 2013).

Fishing		
Area	***Benefits***	***Observations***
Apo Marine Reserve, Philippines	Enhancement of catch of jacks and surgeonfish	Less fishing effort brought higher catch rates
Columbretes Islands Marine Reserve, Spain	Net gain of >10% in weight of the local lobster fishery catch	Caused by annual lobster spillover of 7% of the protected population. Benefits outweighed the costs of the reserve creation
Soufrière Marine Management Area, Saint Lucia	Increased adjacent catches by 46–90%	In only 5 years, despite a 35% decrease in area of fishing grounds
Sinai Peninsula Marine Reserves, Egypt	66% increase in catch per unit effort	Within only five years of the creation of the reserves
Mombasa Marine National Park	Fisher income near reserve 135% higher than in open access areas	Profits increased despite heavy fishing, diverse gear and catch, poverty, and unregulated markets
Ucunivanua marine reserve, Fiji	Clams became 7 more abundant in the adjacent fished area	After only 5 years of protection. Caused by larval dispersal.
Georges Bank fishery closure	Scallop recruitment increased around the closed area	Scallop biomass increased over 14 times over 4 years in the closed area, and produced significant larval dispersal
Tourism		
Area	***Annual revenue***	***Observations***
Cabo Pulmo National Park, Mexico	$12,000 per capita	Higher than in most coastal communities in Mexico
Saba Marine Park, Netherland Antilles	$3 million	22% of the local economy
Mombasa Marine National Park, Kenya	$3.5 million km^{-2}	350 times higher than fishing revenue
Medes Islands Marine Reserve, Spain	€10 million	In only 94 ha of no-take area. 20 times higher than fishing revenue
Great Barrier Reef Marine Park, Australia	AU$5.5 billion	36 times greater than income from commercial fishing, plus 54,000 full time jobs

Significant initiatives launched by India under the National Action Plan for Climate Change (NAPCC)

India has a long coastline with many unique features, characteristics that necessitate dedicated management to elicit climate-adaptive responses. To achieve this end, the Ministry for Environment, Forests, and Climate Change (MoEFCC) has proposed the creation of a National Coastal Mission. The goal of the Mission is to achieve sustainable development by securing integrated management within coastal regions, reducing the vulnerability of the coast, augmenting food security, improved carbon sequestration to offset the impacts of climate change, ensuring the livelihoods of coastal communities. The approach adopted by the Mission would be to strike a balance between the often competing uses for coastal resources – economic development and conservation.

The intention of the National Action Plan for Climate Change (NAPCC) is to mitigate the adverse impacts of and promote adaptation to climate change. The concept of co-benefits, introduced in the NAPCC, is meant to concurrently address the challenges of climate change and further development goals by producing co-benefits for both. The need of the hour is to integrate the development initiatives within a framework for Coastal Marine Spatial Planning (CMSP). In a similar manner, proactive and effective management is necessary to coordinate integrated coastal zone

management (ICZM), marine protected areas (MPAs), NAPCC, land use planning, and other policies and regulations that are relevant to control of development.

The Blue Economy Working Group 2 Report discusses the envisaged policy recommendations as short-term and medium-term interventions.

The following are the short-term interventions:

- Creation of a National Ocean Development Authority
- Development of a National Policy on Marine Litter by 2020
- Reprogramming of financial resources across government agencies for expenditure allocation for CMSP
- Formation of a Domain Expert Group for devising comprehensive sectoral roadmaps with associated action plans
- Enacting appropriate legal framework for the implementation of CMSP that resonates with other national and international regulations and policies

The medium term interventions include:

- Recognition and development of marine agro-industrial spatial clusters for promoting innovation, generate employment, and draw foreign exchange
- Data management and map policy for implementing and enforcing plans that include factors such as generation, sharing, and transparency of data, and monitoring and evaluation of performance via well-defined performance indicators and improved interface with the public.
- International cooperation with the countries within the Indian Ocean Rim Association (IORA) as well as leading entities in Marine Spatial Planning for its successful implementation.
- Expanding the domestic capacity for appreciating the importance of CMSP by encouraging this field within higher education institutions by devising specific curricula and courses and creating a skill-based workforce with appropriate training

CREATING NEW PATHWAYS

Though India faces several ocean based challenges, it has taken cognizance of the importance of the resource and is undertaking efforts to address the challenges. India has committed to SDG 14 goals and is working towards the Agenda 2030, however the SDG 14 doesn't encompass solutions to several blue economy complexities.

The SDG 14 targets are specific and largely focus on fisheries, marine pollution, biodiversity (MPAs), climatic impacts and ocean governance, however the issue of livelihoods and oceans intrinsic value for food and nutrition security isn't clearly evident in its targets and indicators.

Deliberations on enhancing eco-system based services and biodiversity conservation linked livelihood generation needs to be critically examined. The framework for accounting blue economy contributions shouldn't be limited to economic indicators but encapsulate the value of biodiversity conservation, natural carbon sinks and the need to preserve the indigenous species.

Emerging and new sectors should envision plans and policies taking into cognizance the impact on ocean based eco-systems. While there is no denying the fact that oceans will open new frontiers of science and technology, however each new human intervention should take into consideration lessons from the past and ensure mechanisms that preserve oceans' health. A healthy ocean will surely ensure a healthy economy.

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Quadrilateral Dialogue Series

KAS- TERI-FICCI-NMF

2020-2021

Event Schedule

Event	Tentative Title	Proposed Date
	TERI-NMF-KAS-FICCI Blue Economy	
Diginar 1 (NMF)	**Holistic Maritime Security In The Indian Ocean Region: Pursuing A Sustainable And Secure Blue Economy**	21st September, 2020
Diginar 2 (TERI)	**Ensuring sustainability of oceans for a healthy economy- securing livelihoods and enhancing security**	28th October, 2020
Diginar 3 (FICCI)	**Established Sectors : Growth Opportunities and Financing Blue Economy in Post Pandemic world**	10th November, 2020
Diginar 4 (NMF)	**Indo-Pacific and Blue Economy**	18th December 2020
Diginar 5 (FICCI)	**Blue Economy: Emerging Sectors and New Technologies**	28th January 2021
Diginar 6 (TERI)	**Advancing Science and technological innovation to accelerate blue economy in India**	17th February 2021
National Conference (TERI)	**Blue Economy- India's' Pathway to Sustainable, Secure and Resilient Economy**	March 2021