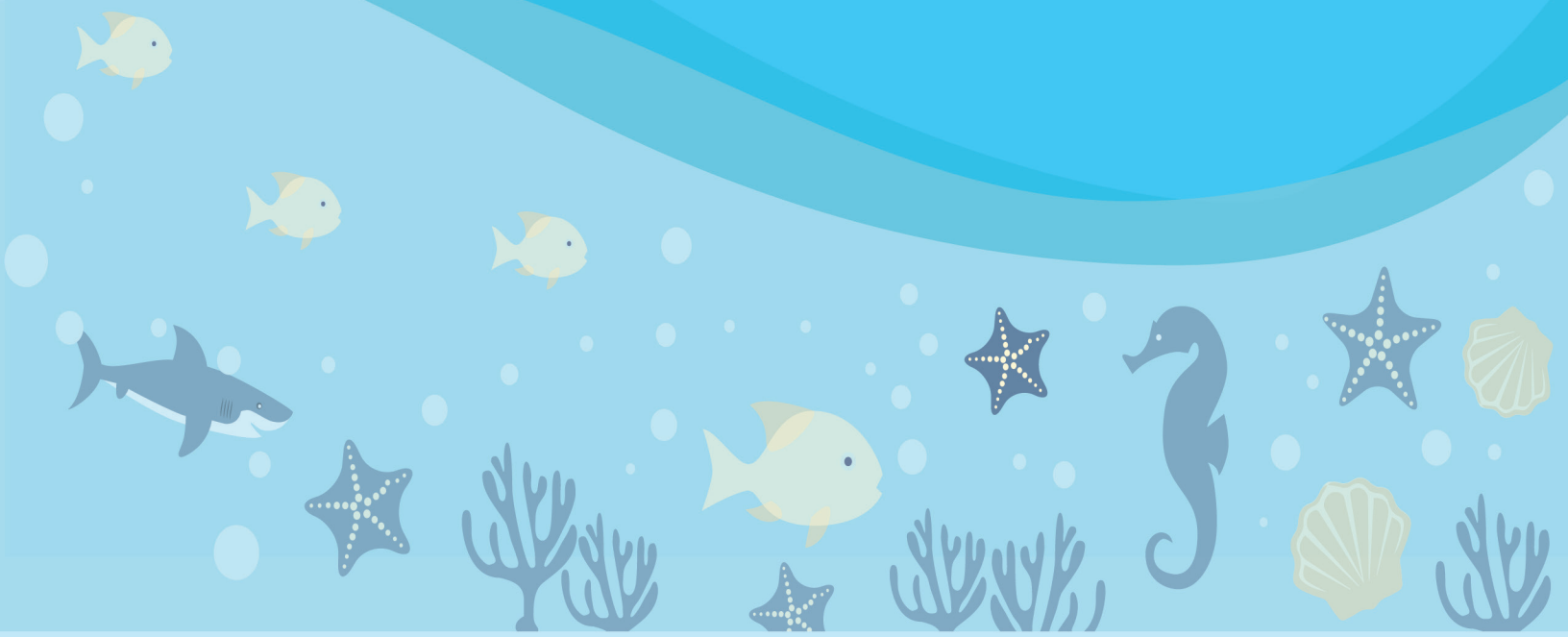
BLUE ECONOMY

Enhancing Growth and Sustainability



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Fostering Dialogue on Blue Economy

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Unleashing the Potential of Blue Economy

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Introduction

Following decades of debate on the quest for an ideal development strategy which can embrace the Post War concepts of 'growth oriented strategy' and 'sustainable development' in a comprehensive strategy, there is some further development in the form of Blue Economy. Amalgamating positive elements of both the strategies, the Blue Economy has emerged as an alternative development strategy which is consistent with the development thinking of both developed and developing countries. In the Post War period, the growth oriented strategy emphasised on the use of domestic endowments to maintain high growth with stability. With depletion of land resources, development focus gradually shifted towards 'sustainable development' which remains the main plank of development focus. Despite experimenting with both strategies over half a century, underdevelopment remains wide spread in the world over. Now there is a need for a development strategy which can promise high growth with sustainable use of resources for economic development. Blue Economy has the mandate of fulfilling these objectives by relying on the ocean health and resources generated from it. The ocean can unleash colossal opportunities, but sustainability norms need to be adhered to access these possibilities.

Definition and Measurement

Ambiguities concerning the scope and coverage of blue economy and the overlapping boundaries between blue economy and related concepts such as coastal economy, ocean economy and marine economy complicate the empirical study of blue economy. A proper definition would enable empirical estimation of blue economy for different countries and facilitate cross-country comparison. It would require convergence in competing thoughts and perspectives on the essential features of blue economy. Mohanty, Dash, Gupta and Gaur (2015) define blue economy more systematically by drawing the sharp distinction between the apparently similar concepts such ocean economy, coastal economy and marine economy. To them, 'Blue Economy' covers all ocean-related activities including direct and indirect supporting activities required for functioning of those economic sectors while adjusting to the costs of environmental damage and ecological imbalance caused due to exploitation of ocean resources for consumption. Blue economy is different from green economy as it goes beyond preservation and addresses sustainability issues with emphasis on regeneration and the evolutionary path of ecosystems.[1] In a larger sense, it means that the world cannot afford to cherish 'brown economy' any more as the current practice of production and consumption in the form of massive scale of resource extraction and high carbon energy consumption is not sustainable and equitable. With regard to sustainability, blue economy links production and consumption systems to the long-term capacity of ocean ecosystems and envisages efficiency and optimization of marine resources to ecological limits (EIU, 2015; UNCTAD, 2014). In terms of the broad principles the core elements

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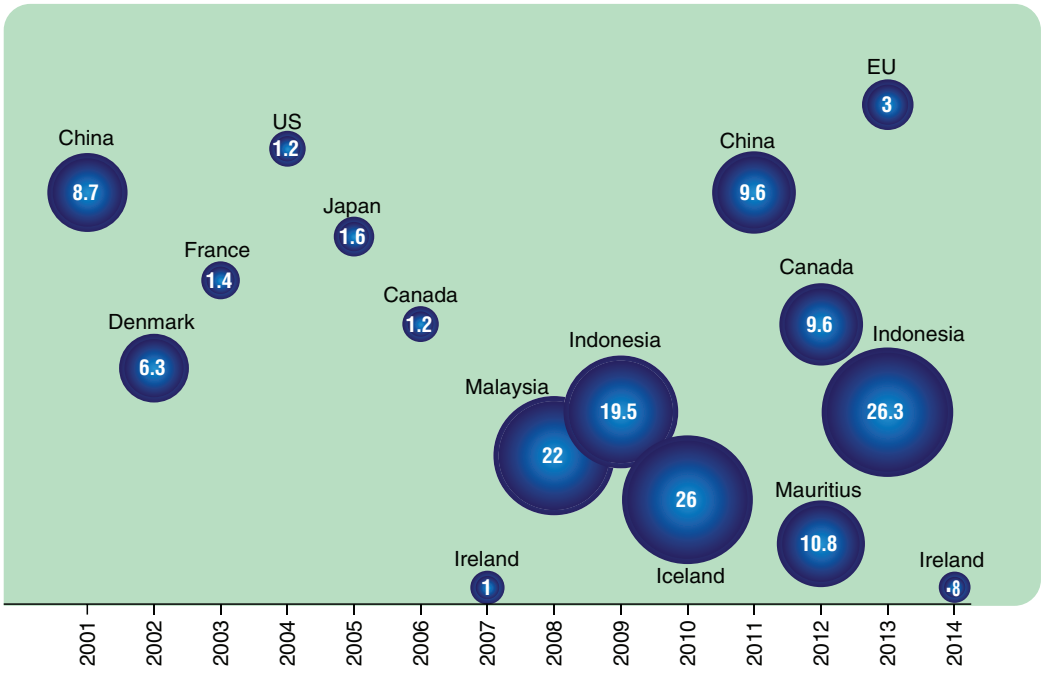
that represent the distinct features of blue economy are local sourcing of raw materials, employment of local workforce, use of low-carbon energy sources, waste recycling, diversification of food and livelihood options, conservation of living and non-living marine resources, promotion of small-scale industries and so on.[2]

Another crucial issue concerning blue economy is the measurement of its size and the contribution to GDP. Since there is no commonly accepted statistical framework to define the coverage of sectors and the activities in those sectors, the empirical measurement of blue economy remains a contentious area. This is probably the reason for not having any consolidated global database on blue economy sectors. As a result, policy formulation for promoting blue economy and exploring cooperation at the regional levels becomes difficult. The available estimates based on national statistical systems for the United States, Australia, Ireland, United Kingdom, China, Indonesia and others are merely indicative only and lack consistency and scientific basis for cross-country comparison. Besides certain identifiable major sectors, the existing international and national statistical systems do not provide any systematic basis for valuation and measurement of non-market goods & services and ecosystem benefits, more specifically at higher levels of product disaggregation. Two statistical frameworks such as the National Accounting System (NAS) and Input-Output (IO) table are widely referred in the estimation of blue economy analysis. China uses input-output analysis[3] whereas the United States and EU use NAICS[4] and NACE classifications respectively.[5] Ireland reports statistics on blue economy as per the NACE classification. Regardless of the sectoral coverage, those classifications broadly correspond to the ISIC classifications. As it appears, the accounting system and data reporting will gradually converge to the ISIC categories.

Contribution of Blue Economy to GDP

There are no comprehensive stylized facts on blue economy except a few spotty evidences for a few sectors in certain countries. Different sectors dominate the structure of blue economy in different countries. For instance, the contribution of agricultural sector to GDP is 36 per cent for Brunei. Likewise, hydrocarbon accounts for one-third of GDP in the EU. Marine manufacturing and marine services contribute 34 per cent and 83 per cent of GDP in China and the United States respectively. Figure 1 presents variations in country experiences in regard to contribution of the Blue Economy to the overall GDP of littoral countries. In large economies like the US, the EU and China, contribution of Blue Economy to total GDP differs significantly. Taking lessons from small littoral

Figure 1: Contribution of Blue Economy: Country Experiences



Source: Authors' compilation from different sources.

Note: The size of the bubble represents the percentage contribution of blue economy to country's GDP.

countries like Mauritius, Iceland and Denmark, contribution of Blue Economy has been very large to total GDP. Some large economies like Indonesia and Canada have witnessed impressive rise in the share of Blue Economy in country's GDP. Littoral countries of similar size may not have similar level of contribution by Blue Economy (i.e., Japan and China; Ireland and Iceland). Apparently, the contribution of blue economy to overall GDP of China, and Mauritius is quite substantial; more than 10 per cent. Some countries observe their Blue Economy contributing between 20 t0 25 percent of their GDP and some of these countries include Malaysia, Indonesia and Iceland.

In the existing literature, estimates are available for a few countries. For each country, estimates are also calculated for one or a few points of time, barring some countries like the US and Australia. This indicates complex nature of estimation procedure involved in the valuation of the Blue Economy. As mentioned above, these estimates are merely indicative in nature. Policy inputs cannot be inferred out of these sporadic computations. It requires time series data on various activities in different sectors of blue economy. Employment creation in blue economy sectors appears to be impressive. The magnitude of job creation in China, United States, UK, Canada and France highlights the importance of blue economy for achieving sustainable and inclusive growth in the coastal nations. Although the size of blue economy is significantly large for some countries, there are some blue economy-driven economies such as Seychelles and Mauritius whose future depends on the performance of the blue economy itself.

Opportunities in Blue Economy Sectors

Blue economy sectors are believed to have huge untapped potential which could go a long way in diversifying the local economies in the coastal nations by generating additional output accruing from utilization of marine resources and expanded occupational choices created with local knowledge and resources. Besides diversification of individual sectors, an integrated and holistic approach towards blue economy can help multiply inter-sectoral linkages as well.[6] Table 1 presents the sectors and industries that are covered under the purview of blue economy.

Fisheries and Aquaculture

Fishery accounts for a significant fraction of blue economy output in many coastal nations of the world. With advancement in fishing technology, the dependence on fishery for food and livelihood[7] is growing rapidly. Trade in fish products has also increased.[8] Rising consumption combined with stagnant capture production sends worrying signals in view of the faster depletion of biological stock of

Table 1: Taxonomy of Blue Economy Sectors

Broad NAS Sector	Sub-Sector	Industries	
		Traditional	Emerging
Agriculture	Fisheries	Capture fishery, Seafood processing	Multi-specie aquaculture; fish processing; marine aquatic products
Manufacturing	Deep-sea mining	Oil & gas exploration,	
	Marine biotechnology		Marine derived bio-products, seaweed harvesting, seaweed products
	Boat & ship making		
	Ship repairing		
Services	Ports & Shipping		
	Tourism	Coastal tourism, Eco-tourism and yatching	Cruise tourism, nautical tourism
	Transportation & logistics		
	Marine construction	Short sea shipping	
	Maine commerce		
	Marine ICT		High-tech marine products and services
	Banking & financial services		Marine legal services, Marine financial services, marine insurance, marine
	Marine renewable energy	Offshore wind, offshore wave, tidal	

Source: Mohanty, Dash, Gupta and Gaur (2015) based on various sources.

major fish species. Fish farming meets the growing demand for raw and processed fish products, however at the cost of environmental pollution. Moreover, aquaculture is unlikely to be substituted for capture fishery as natural endowment of fish species and aquatic plants is not only a source of subsistence and commercial fishing but contributes to the health of ocean habitat also. Better processing facilities, harmonization of food safety standards and effective legal and governance mechanisms would enable value addition and make fish trade more remunerative. India, China, Indonesia, Thailand, Bangladesh and Japan are the leading nations of the world for fish production and trade. Pelagic fishes are mostly demanded in the USA, EU and Japan. For food and livelihood security, processed fish industry would play a big role. Aquaculture would continue to be the major source of supply for consumption of raw fish and processing. Investment in processing technology and integration to the fish value chain would promote fishing and fishing-related services in the costal nations.

Offshore and Deep-Sea Mining

Marine minerals in the coastal areas and in the seabed would play key role in development of blue economy. Offshore minerals particularly placers are sources of important metals like titanium, tin, rutile, ilmenite and monazite. Placer minerals are used for various industrial applications in electronics, aerospace, petroleum, paint, bio-medical and refractory industries. There are plenty of placer deposits along the Indian Ocean rim region. Indian companies are exploring joint collaborative initiatives with foreign companies to utilize the huge reserve of placers in its coasts. On the seabed, three different types of mineral deposits such as seafloor massive sulphides (SMS), polymetallic nodules and cobalt crusts are found. SMS deposits that include copper, zinc, lead, gold, silver, etc are largely found in the Mid-Atlantic Ridge, Indian Ocean Ridges and the South West Pacific. Polymetallic nodules comprising of manganese, nickel, copper, cobalt and others are found in Clarion-Clipperton Zone, Peru Basin, Penyrlyn Basin and Central Indian Ocean. In addition, the Pacific Prime Crust Zone (PPCZ) and North-East Atlantic are rich in cobalt crusts. On technology front, marine submersible and mining technology is advancing fast in many mining nations of the world. While UK, China and other countries are thinking of up-scaling activities for deep-sea mining, the Pacific Islands including Fiji, Papua New Guinea, the Solomon Islands, Tonga and Vanuatu have granted permits to global mining companies for deep-sea exploration. In terms of regulations, the International Seabed Authority (ISA) is still working on regulations for commercial mining on the seabed even though it has issued licenses to many countries for exploration in deep-sea. Till date, there is no commercial deep-sea mining in the world even though various agencies have estimated its potential. Nautical Minerals of UK will be the first commercial venture to begin commercial operations in the Papua Guinea national waters in the year 2018.

Marine Manufacturing

Marine manufacturing covers several sectors including marine engineering and instrumentation, deep-sea mining technology, marine biotechnology, ship making and repairing, boat making, and related activities. In the marine biotechnology sector, the USA, EU and some other countries have achieved remarkable progress in development and commercialization of drug molecules, nutraceuticals and functional foods. Despite strong commercial interests in the sector factors like longer gestation period for understanding the structure of compounds, uncertainty over extraction and fermentation of marine organisms, financing of R&D and commercialization of drugs act as disincentives for large-scale investments by the private companies. Small and Medium Enterprises (SMEs) dominate this sector even in European countries that are at more advanced stages of product innovation, networking and marketing.[9] Moreover, most of those companies focus on a few products in one of three segments of blue biotechnology industry- pharmaceuticals, nutraceuticals and functional foods. Many of them switch from drug development to production of food additives, proteins, enzymes, etc on grounds of high risk of returns to investment. As of date, drugs developed from marine organisms are primarily anti-cancer and anti-inflammatory. Marine organisms that are the sources of most marine compounds are microalgae, sponges, fungi and bacteria.[10] Harvesting of marine organisms has improved with better underwater exploration technology, innovations in scuba diving and introduction of Remotely Operated Underwater Vehicle (ROVs), unmanned vehicles and gliders (Greco and Cinquegrani, 2016). Likewise, significant potential exist in other sectors of marine manufacturing as mentioned above.

Offshore Ocean Energy

The commercial exploitation of renewable offshore ocean energy sources is expected to bring transformation in the global energy scenario. As per estimates, the world can develop 337 GW of ocean energy and create 300,000 jobs by 2050. Unlike other sources of renewable energy, ocean energy technologies are not yet fully tested for commercialization. For instance, despite a number of pilot and demonstration projects in the wave energy sector, a few cases of commercialization are observed.[11] Among other sources, tidal energy technologies are more mature and commercially viable. The new technologies developed for tidal range power generation are tidal lagoons, tidal reefs, tidal fences and low-head tidal barrages. Likewise, 40 new devices are also introduced in tidal stream technologies during 2006-13.[12] The leading countries for technology development in tidal energy are Canada, China, France, Ireland, Japan, South Korea, Spain, UK and USA. It is believed that offshore solar could be a leading source of renewable energy. However, the Levelised Cost of Energy (LOCE) per kWh is high for offshore energy compared to other ocean energy sources (Kumar, Shrivastava and Untawale, 2015). Financing of offshore wind farms could be a potential hurdle for technology development and installation. By examining the financing pattern of wind farms in EU, EWEA (2013) provides alternative funding models which involve project finance, project bonds, recycling and re-financing of debt and equity investments by the power producers, and so on. In order to develop these sources as sources of household and industrial energy consumption, emphasis should be placed on development of cost-effective ocean energy technologies and sustained flows of investment for commercialization.

Marine Services

Along with growth in services sectors worldwide, the interest in marine services is also growing particularly in the blue economy-driven economies. Marine services include diverse sub-sectors such as port & shipping, coastal and eco-tourism, marine ICT, marine banking & insurance, marine commerce and so on. Most of those sub-sectors possess enormous potential for innovation, growth and occupational diversification.

Rise in seaborne trade and commercial shipping along with a host of other factors such as demand for raw materials, rapid industrialisation, trade liberalization, urbanization and competitive international ore prices provide impetus for the growth of port and shipping services. The activities of this sector include transportation of goods and passengers, pilotage, towing, tug assistance, repairs, anchorage berth and berthing services, storage and warehousing, maritime cargo handling services and custom clearance services. During global boom (2003-07) tonnage demand doubled from 3 per cent in 1990s to 6.5 per cent in the 2000s (Mitroussi, 2013). Some IORA countries including India, Indonesia, Malaysia, Iran, UAE, Singapore, Australia, Thailand, South Africa and Oman have registered robust performance in container port traffic. IORA countries exhibit strong growth in trade of shipping services covering sea transport freight, sea transport passenger and other sea transport.

Globally, coastal tourism is viewed as an emerging segment of blue economy.[13] According to European Parliament (2008), coastal areas are preferred most among the tourist destinations. The universe of coastal tourism covers a range of activities including sea angling, bird watching, boating at sea, dolphin watching, scuba diving, swimming in the sea, cruise and others. Cruise travel is a promising activity in the Indian Ocean, Baltic Sea, Mediterranean and other oceans.[14] There are a number of special interest cruising which include wellness at sea, freighter cruises, river cruises, etc. Hotel & restaurants and transport sector expand along with the spurt in tourist arrivals in the coastal cities and eco-tourism spots. By implementing suitable site development, peripheral development plans for urban fringe areas and innovative financing schemes the potential of coastal and marine tourism can be harnessed fully.

Marine information and communication technology (ICT) sector covering satellite monitoring, analysis of big data for biodiversity, pollution, weather pattern, ecosystem evolution, fishing zone advisory services, ocean state forecast, storm surges, cyclones, monsoon variability, tsunami, R&D services including validation of satellite sensors, parameterization of key processes for models and verification of model simulations is an emerging sector of blue economy. It may expand further depending upon the emphasis given to ocean data recording, analysis and simulations.

Marine commerce is a pivotal segment of blue economy comprising of business services, marine retail services, marine financial services, maritime insurance, ship leasing, support activities, wholesale trade, maritime legal service and other marine services. Maritime insurance businesses have

registered growth over time. Ship finance is another potential sector for expansion in the Indian Ocean region. Marine conservation finance is also emerging worldwide as a separate category of marine financial services.

Global and Regional Initiatives

The growth of blue economy rests upon a scientific approach towards ocean development. Ocean development broadly refers to proper conservation and management of living resources such as fisheries and aquatic plants and non-living resources such as minerals, oil & gas, etc; identification of new resources, enhancing use of existing resources, and international cooperation in governance and regulation of marine resources. Different national and regional initiatives are underway to promote blue economy in the coastal economies. In essence, those initiatives envisage a future roadmap for blue economy setting certain measurable outcomes and the enabling conditions to achieve them. Some countries have passed National Ocean Acts[15] whereas some others have made special budgetary provisions for blue economy. Some of those countries that have National Ocean Policy include Australia, Brazil, Canada, China, Colombia, Japan, Norway, Portugal, Russia, United Kingdom and the USA. Three countries such as the USA, Canada and Australia have special legislations and specific provisions for ocean policy in their national budgets. Moreover, Canada and Australia have established a systematic hierarchy of institutions at federal and state levels to plan, coordinate and monitor the progress on various pillars of ocean policy. In Canada, three different layers of institutions comprising of National Ocean Act, Ocean Strategy and Ocean Action Plan govern the development, management and governance of ocean resources. Similarly, a multi-layer institutional architecture consisting of Ocean Policy, Regional Maritime Plans, Integrated Ocean Planning & Management, Minister for the Environment and Heritage, National Advisory Group and others deal with marine and marine-related issues.[16]

Countries such as Seychelles and Mauritius have established separate ministries for blue economy. Some countries have formulated integrated maritime policies for promoting blue economy sectors and industries in their economies. For example, the Government of Mauritius formulated a Roadmap for Ocean Economy in 2013 which included diverse objectives, action plans and mutual-reinforcing sectoral components. In 2009, the Government of Australia launched a Strategic National Framework for Marine Research and Innovation. In Europe, the Netherlands, Denmark and Norway are quite successful in implementing the blue economy policies. Following their success, Ireland introduced a Marine Knowledge, Research and Innovation Strategy in 2006 for the period 2007-13 which aimed at policy measures to promote blue economy sectors in the Irish economy. The CARIFORUM-EU Economic Partnership Agreement signed in 2008 encourages the importance of fisheries and other living marine resources in the CARICOM member states and the Dominican Republic. Likewise, the Interim Partnership Agreement between the European Community and the Pacific States contains provisions for trade in goods with a special derogation in Rules of Origin for fishery products.

Among the EU members, the region-wide research and networking initiatives such as EU Joint Programming Initiative Healthy and Productive Seas and Oceans (JPI-OCEANS), European Marine Biological Resource Centre (EMBRC), CSA MarineBiotech, European Research Area Network (ERA-NET), Association of European Marine Biological Laboratories (ASSEMBLE) and others are aimed at developing a common research infrastructure and coordinated research area in the field of marine biotechnology. Trans-regional initiatives like Mediterranean Science Commission (CIESM), Sustainable Uses of Baltic Marine Resources (SUBMARINER) and BioMarine are designed to contribute to promotion of research and applications in marine biotechnology sectors. These national and regional initiatives are necessary to build capacity and foster creativity in core industries and sectors of blue economy.

Conclusion

Blue economy is being viewed as a holistic development paradigm that propagates a growth process which stresses upon the optimum and efficient utilization of marine resources without compromising the sustainability aspects. In essence, blue economy paradigm emphasizes upon maximum and economically efficient utilization of under-exploited marine resources or new marine resources which are currently not used either for household use or for commercial purposes. This approach towards marine resources fits well to the coastal nations whose economic fortunes depend on the marine resources particularly the Small Island

Developing States (SIDSs) such as Seychelles and Mauritius. Even the advanced economies such as the USA, Canada and Australia consider blue economy as the new source of economic growth especially after the economic recession following the Subprime crisis in 2007. By and large, all coastal nations across the income categories now view blue economy as an important sector of their economies which gets reflected in the enactment of specific legislations and programmes for ocean development. Many countries in the Indian Ocean region including India, Australia, Bangladesh, South Africa, Kenya, Mauritius and Seychelles view blue economy as a strategic economic sector for achieving economic growth and other developmental objectives.

While there exists some sort of consensus over the potential of blue economy (at least in terms of broader objectives) for social and economic development, uncertainty prevails over its quantification and empirical validation. At present, there is no such universally acceptable definition of blue economy which not only create difficulty for measurement of its size and related indicators but also affects the policy making process for ocean resource development and management. Based on available literature Mohanty, Dash, Gupta and Gaur (2015) have attempted to clarify those contentious issues to a reasonable extent. Blue economy broadly covers living resources such as fisheries and aquatic plants and non-living resources such as polymetallic nodules, cobalt crust, rare earth metals and other minerals, oil & gas, port & shipping, coastal tourism, marine biotechnology, marine commerce and so on. Of those, capture fishery, oil & gas exploration, shipping, coastal tourism etc. are the traditional sectors whereas multi-specie aquaculture, fish processing, marine-derived bio-products, seaweed products, cruise tourism and high-tech marine products are some of those emerging sectors of blue economy. Besides their current level of contribution, there is immense potential existing in the above mentioned sectors for diversification and industrial applications.

Among a set of policy measures, role of investment in technology & process development and blue economy-specific legislations and policies are indispensable. The SIDSs such as Mauritius and Seychelles have created separate ministries for blue economy and formulated different policies to promote blue economy in their countries. To a great extent, these two countries are blue economy-driven economies as a significant fraction of their gross domestic products originate from blue economy sectors. Regardless of the level of development, countries including advanced economies such as Canada, USA and Australia and developing economies such as India, South Africa and Kenya recognize the merits of emphasizing upon the marine resources for expanding economic activity and creating jobs especially in a world that confronts the challenge of climate change, resource depletion, killer diseases like Ebola, natural disasters like Tsunami and others. Barring economic considerations, the countries that embrace blue economy as a development paradigm implicitly value the importance of resource sustainability and other parameters of environmental and ecological sustainability. With sustained efforts, blue economy shows great optimism towards achievement of the Sustainable Development Goals.

Endnotes

1 See Pauli (2015). Our intention here is not to distinguish between 'green economy' and 'blue economy' rather to highlight the unique features of blue economy.

2 See UNECA (2015), UNCTAD (2014), EIU (2015a) and EIU (2015b) for sectoral inter-linkages among the blue economy sectors.

3 Wang (2016) adopts the input-output table to estimate activities in different ocean industries in China.

4 See Colgan and Kildow (2013).

5 National Ocean Economics Program (NOEP) of the United States provides data for ocean economy and coastal economy separately as per the NAICS 2004 classification. Park (2014) mentions the difficulties of computing measures of blue economy for Korea due to absence of any national statistical framework for ocean economy.

6 Mohanty, Dash, Gupta and Gaur (2015) identify the key sectors of blue economy and the likely intensification of activities in those sectors in the Indian Ocean region.

7 FAO (2007) highlights the role of small-scale fishery in poverty alleviation and food security.

8 See FAO (2014).

9 Information about blue biotechnology sector is scattered. Even the reports on biotechnology by leading consulting firms like Ernst & Young and Deloitte do not mention the names of the companies those deal with marine organism and molecules (Greco and Cinquegrani, 2016).

10 Rangel and Falkenberg (2015) mentioned that the no. of bioactive natural products derived from marine organisms has increased due to improvement in techniques for elucidation of chemical structure of the molecules and chemical synthesis in the 1990s.

11 See IRENA (2014a).

[12] For tidal energy policies in different countries, see IRENA (2014b).

[13] UNEP (2009) observes that growth of coastal tourism has reached its peak in the recent decades.

[14] Polat (2015) mentions four different types of markets for cruise travel: - (1) contemporary market, (2) premium market, (3) luxury market and (4) adventure/ exploration market.

[15] Regional mechanisms would help pursue mutual goals among SIDSs (See UNECA, 2015).

[16] See Repetto (2005).

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Blue Economy, Ocean Development and SDG-14

Implications for the Marine Ecosystem

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Introduction

Blue Economy is emerging as a new development paradigm which is more just and acceptable to both developed and developing countries. Spotty evidences demonstrate that the ocean-driven segment of 'Blue Economy' is one of the most dynamic segments of the economy in several countries, irrespective of their economy sizes. The challenges faced with the oceans lead to a new wave of global governance efforts such as the forum of Global Ocean Governance which cover issues related to goods and services provided by the ocean ecosystem. There are immense potentials with the oceans not only in the aqua sector, as viewed traditionally, but also with other sectors including those of mining, energy, construction, manufacturing and services (Mohanty *et al.*, 2015). Realisation of these potentials for economic development is not automatic in nature, rather appropriate strategies are to be evolved in order to harness those.

The importance of oceans to mankind was known for centuries, but the relevance of global governance for development of ocean health came to the fore in the 1990s.

The Earth Summit in 1992 highlighted ocean as the target for environmental protection. The Summit emphasised on sustainable use of marine living resources and conserving them in the high seas. Ten years later, the Earth Summit for Sustainable Development in Johannesburg drew a detailed action plan for implementation of ocean and coastal sector development as proposed in the earlier Rio Earth Summit. As a follow-up action, the Millennium Development Goals (MDGs), further widened the unfinished agenda of sustainable development in 2000 and provided a wider space for the global policy action. MDG-7 focused on environmental sustainability and also had specific focus related to oceans like Targets 7.4, 7.6 and 7.7, as shown in Table 1.

However, the MDG targets and indicators emphasised on various human dimensions including poverty, hunger, education and health, where the marine-related issues were inappropriately blended, leading to failure of the strategies to integrate ocean conservation issues effectively with social, environmental and developmental aspects (Houghton, 2014 ; Cicin-Sain *et al.*, 2011).

The Rio+20, the Third Earth Summit conference organsied by United Nations on Sustainable Development in 2012 focused on expanding the green economy in the blue world. With the leadership of Small Island Developing States (SIDS), the coastal nations advocated Blue Economy as a paradigm for sustainable use of ocean resources. The basic inferences emanating from the High-Level Plenary Meeting of the UN General Assembly in 2010 and the Rio+20 conference have shepherded the global thinking to evolve a composite global development plan of action as the Universal Sustainable Development Agenda during the high level summit in September 2015. In the Summit, a separate goal, i.e SDG-14, was included in the Sustainable Development Goals

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Table 1: MDG Targets and Indicators Related to Oceans

Targets	Indicators
Target 7.A: Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources	**Indicator 7.4:** Proportion of fish stocks within safe biological limits
Target 7.B: Reduce biodiversity loss, achieving, by 2010, a significant reduction in the rate of loss	**Indicator 7.6:** Proportion of terrestrial and marine areas protected
	Indicator 7.7: Proportion of species threatened with extinction

Source: Compiled from Official List of MDG Indicators, United Nations, 2008, web link: http://mdgs.un.org/unsd/mdg/Host.aspx?Content=Indicators/OfficialList.htm

(SDGs) as a guiding path for global governance for sustainable use of ocean resources. With the recognition of the SDG Goal-14 as a global action plan for ocean development, the relevance of the Blue Economy as a global strategy for sustainable development is reinforced in the world economy. The purpose of this policy brief is to examine protection of ecosystem as an integral part of the Blue Economy and discuss the manner in which SDG-14 aims at full-grown development of the ecosystem. While referring to development of the ecosystem, SDG-14 refers to issues relating to sustainability of fisheries, mangroves, carbon sequestration, maritime protected areas, fresh water flows, etc. and regulating acidification, marine pollution and debris, IUU, fishing, etc. to protect marine coastal ecosystem.

Debating SDG-14

Towards a Stand-alone SDG

During discussions in the framework planning of SDGs, there were two streams of views which had different perspectives on the role of SDG-14 as an independent goal for oceans. While one group of countries proposed a stand-alone SDG for the oceans, others argued in favour of having an integrated goal for natural resources[1].Most of the SIDSs[2], particularly Pacific Small Island Developing States, Pacific Islands Forum, Romania, Poland, Maldives, New Zealand and others, favoured a stand-alone SDG for ocean development. It was argued that oceans have large potential which can greatly influence the lifestyle of people in the littoral countries. Following the current trends in the world economy, the ocean development may not be assured automatically, rather concentrated efforts will have to be made to reap huge gains from the oceans. Separate SDG for the oceans could provide justifications for countering the existing challenges that are being faced in the way of proposing a plan of action for ocean development.

Another group of countries such as France, Germany, Switzerland, India, Pakistan, Sri Lanka, etc. was not in favour of pursuing a separate SDG for the oceans . Pakistan, on behalf of India, and Sri Lanka presented the view that "lone, singular and numerous SDGs removed from their entire context are not likely to produce desired result".[3] However, prolonged debate on the issue made the global community to realise that ocean sector is going to play an important role in the economic development of littoral countries. Further, the unsustainable use of ocean and its resources need to be put under the purview of the global governance.

Issues with SDG Targets

Sustainable development has three pillars which include economic, environment and social dimensions. Of the three, SDG-14 is heavily skewed towards the environmental dimension and is loosely-defined for the other two dimensions. According to German Council of Sustainable Development (2015), SDG-14 can be distributed on sustainable development dimensions with 67 per cent accounting for environment dimension, and 5 per cent and 29 per cent for social and economic dimension, respectively. SGD 14 also focuses more on the sustainable environment for protecting the ocean resources and reducing marine pollution. In the present format, ocean development agenda of SDG-14 is more tilted towards environmental rather than economic issues.

Although inclusion of SDG-14 is an implicit recognition of the growing importance of ocean development for humanity, most issues concerning the global ocean governance are not rightfully covered in the SDG-14. It therefore fails to make a balance between reaping economic benefits from oceans and its conservation.[4] Further, problems relating to estimation of indicators remain a major gap in SGD-14. SDG-14 is targeting on specific issues, like reducing marine nutrient pollution and marine debris, management of marine and coastal ecosystem sustainably for achieving healthy and productive oceans, reducing the impact of ocean acidification to the minimal levels, effectively using fisheries and regulating on IUU fishing and removal of certain fisheries subsidies, protecting and conserving marine and coastal areas and sustainable management of aquaculture, amd tourism and fisheries especially for SIDS. These issues are scheduled under 7 targets and 3 means of implementation. While some of the targets have a poor track record of quantification like SDG- 14.2, others like SDG-14.1 and SDG-14.4 suffer from baseline data issues which are yet to be addressed.

SDG-14 has different time-lines for different targets which may lead to uncertainty in fulfilling the goal itself. The time line for achieving various targets for SDG-14 ranges from 2020 to 2030 as shown in Figure 1.

SDG-14 leans more towards environmental aspects of ocean development, which may affect marine ecosystem in littoral countries. Betterment of the marine and coastal marine ecosystem would generate more marine resources which eventually support expansion of the blue economy on a sustainable manner. This would bring competitiveness in blue economy with achievement of SDG-14 targets.

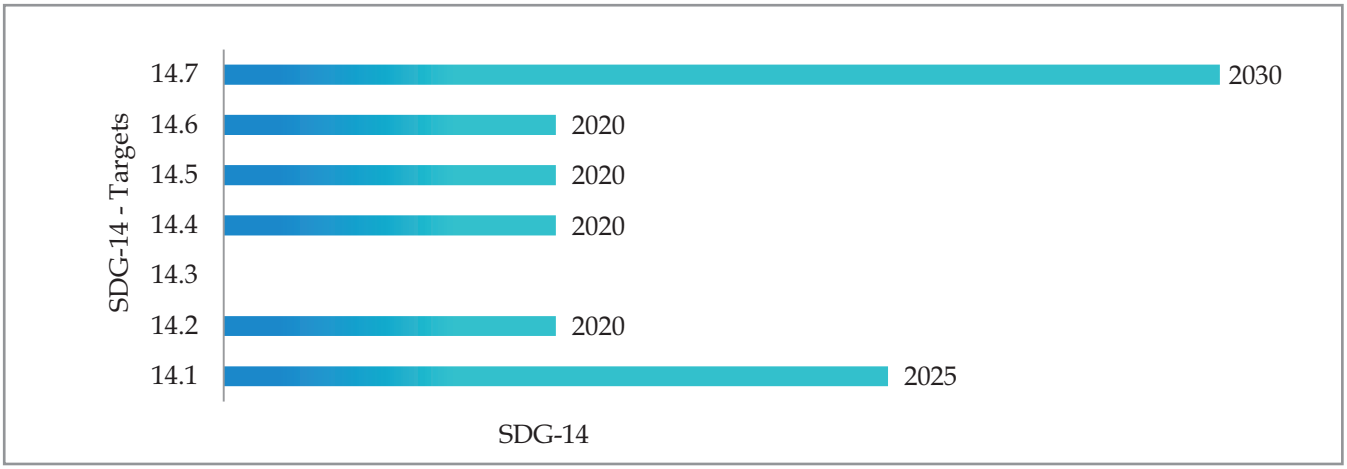
Empirical Results on Issues Concerning Marine Ecosystem

That SDG-14 accords priority to sustainability of oceans, and protection of marine environment has been highlighted in the agenda of policy action. The manner in which sustainability aspects of oceans is maintained by various countries, assessment of efficiency of the sector becomes an empirical question. Since there is consensus about indicators for the SDG-14 targets we have taken some indicators to seek their relevance in the world. Some of the empirical issues relating to experiences of countries in relation to fisheries management (14.6 and 14.4), protection of mangroves (14.2 and 14.5), conservation of marine protected areas (14.5), etc. are discussed below.

Fishery Subsidies

Discussion on subsidies in fishing sector figured prominently in the WTO Ministerial in Nairobi, 2015. The level of distortion caused by subsidy to the fisheries sector is unparalleled in depleting fisheries stocks across the globe. For example, in

Figure 1: Time Line for SDG-14 Targets



Source: Compilation from United Nation (SDG-14), 2015.

an effort to increase productivity in fish catch, subsidising fuel for the larges fish catching vessels created disastrous consequence for managing fish stocks.

However, subsidy as such is not always bad. Fishery subsidies are broadly classified into three categories: (1) beneficial or good subsidies, which enhance the investment in natural fish stock; (2) capacity enhancing or bad subsidies, which are mainly leading to dis-investment in fish stock and overcapacity and un-sustainable use of fishes; and (3) ambiguous subsidies, which may lead to investment or dis-investment in the fish stock.[5] On reviewing the fishery subsidies globally, we find that more than 41 per cent of the total fisheries subsidies are beneficial to the fisheries sector and less than 50 per cent have been accounted to have a deteriorating effect on fish stock for the year 2009. For conservation and sustainable use of fish resources, the global situation of fishery subsidies has improved in the 2000s. For instance, the global beneficial subsidies as a percentage of total subsidies has increased from 37 per cent in 2003 to 41 per cent in 2009, and bad subsidies have fallen from 50 per cent to 46 per cent in the corresponding years. In this regard, some of the better performing countries are Argentina, Bangladesh, Iran, Myanmar, Philippines, Somalia, Vietnam, etc among others.

The beneficial fisheries subsides include subsidies for: (i) fisheries management and services, (ii) fishery research and development, and (iii) maintenance of Marine Protected Areas (MPAs). Of the three sub-categories of the good subsidies, fisheries management and services constituted 64 per cent of the total global good subsidies in 2009. Moreover, with a share of 23.5 per cent in the good subsidies globally in 2009, R&D is emerging as one of the most important sectors in the category of beneficial fishery subsidies. But in terms of allocation, it differs significantly from one Regional Trading Arrangement (RTA) to another. The share of good subsidies in the world decreased from 5.6 per cent in 2003 to 4.8 per cent in the EU in 2009. However, one can observe significant improvement in good subsidies in case of NAFTA.

On the contrary, developing country groupings have demonstrated better performance than those of RTAs of developed countries. To mention specifically, for MERCOSUR 54.2 per cent of total fishery subsidies are good subsidies. More or less, similar trends are observed for other RTAs. The proportions of good subsidy in SACU, ASEAN, SAARC and IORA, are 45.8 per cent, 31 per cent, 27.5 per cent and 26 per cent respectively in 2009. Taking into account the track records of developing countries in allocating good fishery subsidy, it may not be argued convincingly that fish subsidies are detrimental to developing countries.

Nearly 20.5 per cent of global bad subsidy is by the EU, whereas it is below 3 per cent for SAARC, ECOWAS, MERCOSUR and others. When fisheries subsidy is considered detrimental to sustainability of fisheries , the EU and a few other developed countries may be held responsible for it. Bad subsidies include: (i) boat construction, renewal and modernization, (ii) fishery development and support services, (iii) fishing port construction and renovation, (iv) foreign access agreements, (v) fuel subsidies, (vi) marketing support and storage infrastructure, and (vii) tax exemption. Fuel subsidy constitutes the major portion of the total bad subsidies in the fisheries sector. Over the years, regional groupings like IORA and ASEAN have shown significant reduction in the share of their bad subsidies. In this category of fishery subsidy, the highest CAGR of 39 per cent during 2003-09 was registered by the EU, which leaves other RTAs behind in providing fuel subsidies to the fisheries sector. For marketing support and infrastructure subsidies, the NAFTA subsidies grew at the rate of 33 per cent during 2003-09.

The other fishery subsidies, having ambiguous effects, include: (i) fisher assistance, (ii) rural fisheries community development, and (iii) vessel buyback. These subsidies may not be categorized as either good or bad subsides since their impact on fishing sector can go in any direction. The major proportion of such subsidies is appropriated by regions like the EU and NAFTA, accounting more than 43 per cent of the world. A major chunk of such ambiguous global subsidies comes from vessel buyback (57 per cent) and fisher assistance (41 per cent).

Marine Protected Areas

Several initiatives including the Plan of Implementation of the World Summit on Sustainable Development in 2002, the 5th World Parks Congress in 2003 and 8th Ordinary Conference of the Parties to the Convention on Biological Diversity (CBD) in 2006 have aimed at protecting 10 to 30 per cent of marine habitat in the next five years. Global situation for Marine Protected Areas (MPAs) has improved during 2000s. The empirical estimates indicate that the situation has started improving since 2002 following recovery of the global economy. Similar trend continues during the entire period of global buoyancy. After a temporary setback in the event of double dip recession during 2007-09, the world economy witnessed proliferation of MPAs since 2010.

Regionally, Oceania, Caribbean and Europe have maintained large proportion of world's MPAs during the period 1990-2014. However, the situation improved significantly in continents like Africa, Asia and developing Europe. Some of the sub-regions like Western Africa, Western Europe, Southern Africa and Central America have experienced large concentration of MPAs. Rising coverage of the MPAs and balanced spread of such areas are encouraging signs for the world economy.

Threatened Fisheries

The loss of marine fisheries stock has been a global concern. Overfishing, IUU fishing, invasive species, climate change and coastal development are main contributors to the loss in marine species (Polidoro, *et al.*, 2009). Around 2.5 per cent of the global marine fish species are threatened.[6] From the total uniquely threatened marine fish species, vulnerable, endangered and critically endangered species share 69 per cent, 18 per cent and 13 per cent respectively in 2015.

However, the proportion of threatened marine fish species in the total marine fishes is relatively high in the regional groupings like EU (4.62 per cent) and ECOWAS (5.22 per cent). The corresponding ratios for other less affected groupings like IORA, ASEAN and SAARC are 2 per cent, 2.32 per cent and 2.53 per cent respectively. Similar trend continues for critically endangered and endangered species for the corresponding regions. For the critically endangered marine fish species, the EU accounts for 23 per cent of the total threatened marine fish species in the region, whereas the corresponding ratio for groupings like IORA, ASEAN, SAARC, and MERCOSUR ranges from 8 to 12 per cent in 2015. The current trends indicate that the concerns relating to endangered species are relatively less severe for the developing countries rather than for the developed countries.

Protection of Mangroves

Mangroves, the marine tidal ecosystem inherent to tropical regions, are productive ecosystems which provide numerous goods and services as well as various marine activities for marine organisms and human beings. They support in stabilizing the shoreline and reducing the impact of natural disasters like hurricanes, tsunami, etc. among others. They also provide food, fuel, and medicinal resources to local people and provide breeding space to marine species (Giri *et al.*, 2011).

Despite its growing importance in global ecosystem, mangrove cover in the world has been declining at an increasing rate during the last decade. Regional approaches play an important role in maintaining high mangrove cover in the region. Empirical evidences suggest that such trend prevailed during the period 1990-2005. This syndrome is equally applicable to certain RTAs of both developed and developing countries like NAFTA, IORA, ASEAN, among others .

However, area under mangroves has been declining alarmingly in the world for the last two and half decades, and situations has become acute since 2005. The big policy dilemma arises whether this trend can be reversed. What would be the consequences if the present trend continues? For answering these questions, a simulation exercise is undertaken for the world up to 2030. Figure 2 presents the projection estimates of mangroves under three different scenarios. (Scenario I: When best practices from top countries with mangroves are taken into account, how the world economy would respond to the situation. Scenario II: predicting the global situation where moderate estimates are being used, and. Scenario III: where the worst

scenario has been accounted for to estimate global stock of mangroves by 2030. Total mangroves of the world declined to 4.8 thousand hectares in 2015 from 15.6 thousand hectares in 2000, raising deeper concern for the world economy. Countries have demonstrated varying experiences in regard to conservation of mangroves. Based on the experiences of littoral countries, we have identified three sets of growth performances for each country:- best, worse and moderate, during the period 1990-2015. Projections of mangroves up to 2030 are made on the basis these parameters. According to the present estimation, global stock of mangroves could reach to the extent of 13.3 thousand hectares in the worst scenario. With a moderate performance of the world economy, it could be increased up to 15 thousand hectares by 2030. In a situation where countries adhere to their best practices in the past, area under mangroves would increase up to 18.8 million hectares by year 2030. The simulation results indicate that deteriorating situation of the world mangroves can be reversed effectively by learning from the experiences of these countries.

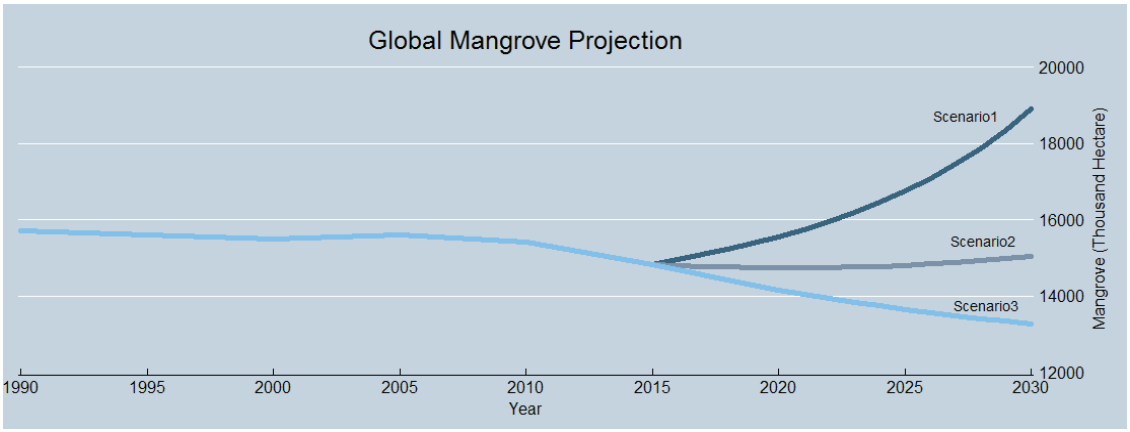
With consolidation of global initiatives and growing concerns on global governance, world marine ecosystem is gradually picking up and these efforts would enable littoral countries to boost their blue economies. Adoption of good fisheries subsidy, better management of the Marine Protected Areas by regional groupings of developing countries, and making efforts to conserve threatened species may enhance efficacy of global maritime ecosystem. Global efforts to increase the size of mangroves could be a stark reality. However, strong global agenda to improve the performance of the ecosystem can immensely contribute to blue economy.

Initiatives from IORA Countries

There is large potential that can be extracted from the oceans; however, strategic policies are needed to harness these potential. Various countries in IORA like Australia, Mauritius, Seychelles, etc. have made significant ocean development plans at the national level. These plans are closely linked with various targets of SDG-14.

The National Marine Science Plan 2015-2025 of Australia identifies a number of policy initiatives for future investment in marine and coastal sector ranging from National Blue Economy Innovation Fund to National Ocean Modelling Program. The Government of Mauritius (2013) launched its roadmap for Blue Economy to present ambitious targets for major areas covered by the oceans. Mauritius and Seychelles have designed their long term development strategies in the framework of ocean development. A number of RTAs have given priority to ocean-linked strategies as the basis for regional economic strategies. Australian Marine Science Plan focusses on target 14.2, 14.4 and 14.5; Mauritian Ocean initiatives on 14.4, 14.6

Figure 2: Global Mangrove Projection



Source: Compilation from FAO Forestry Statistics, 2016

and 14.7; and Seychelles programmes on 14.2, 14.4, 14.5, 14.6 and 14.7. Several programmes in India have been initiated by the Government of India with regards to ocean and coastal management. The Ministry of Environment, Forest and Climate Change (MoEF & CC), Department of Ocean Development and regional organizations have started several programmes like the Bay of Bengal Large Marine Ecosystem project. Another initiative of the Integrated Coastal Zone Management Project has been commenced in three states – West Bengal, Odisha and Gujarat. The project focuses on conservation of coastal and marine resources, pollution management, and improving livelihood opportunities for coastal communities. The Society of Integrated Coastal Management has been set up for the implementation of the project which is led by MoEF & CC at the National level and Department of Forests and Environment at the state level. Due to these national level policies, IORA is emerging as a major crusader for promoting the idea of Blue Economy in the world.

Way forward

Blue Economy holds the mandate of integrating the twin objectives of growth and sustainability for fostering development in the realm of ocean development. The opportunities stemming from the Blue Economy are so much that the latter has become a major issue for global governance. A stand-alone SDG for ocean development is the testimony of the recognition of Blue Economy by the global community. SDG-14 has focused on the conservation and sustainability of the marine and coastal ecosystem. From Rio Summit to the SDGs, the Blue Economy as a major development strategy has travelled a long way in establishing its relevance in the world economy.

Blue Economy is not only concerned with the growth dimensions, but also covers cost of environmental damage, particularly injury to the ecosystem. SDG-14 has the unilateral focus on development of ocean health which can contribute enormously to the mankind and prevent damage in ecosystem.

So far as environmental disquiets are concerned, the world economy has receives mixed responses. It is important to note that the Marine Protected Area is expanding globally amidst global recession. There is potential threat to global fisheries stock due to rise in threatened species. In terms of threatened species, the situation is more acute in Europe than in the developing countries including the IORA countries. This is, perhaps, due to excessive use of bad subsidies in the fisheries sector to raise productivity of fish catch. Bad subsidies in the fisheries sector are more acute in Europe, but good subsidies are largely prevalent in developing countries. Thus, this is making a case for subsidy in fisheries sector to promote Marine Protected Area, initiating R&D activities, etc. in developing countries.

Fisheries sector is adversely affected due to steep decline of mangroves which is the natural habitat of fisheries. Global outlook on conservation of mangroves indicates that the present grim situation can be reversed with a strong global governance initiative. IORA initiatives in these areas are forward looking and several regional countries including Mauritius, Seychelles, Bangladesh, etc. have evolved numerous strategies to promote Blue Economy in the region. Some IORA countries equally campaign for the strategy at different global forums. Therefore, there is a pressing need for emphasising on conservation and sustainable use of ocean resources for providing impetus to marine ecosystem, which is becoming vital for the success of Blue Economy.

Endnotes

1 https://sustainabledevelopment.un.org/owg8.html

2 https://sustainabledevelopment.un.org/content/documents/6040PSIDS%20SDG%20OWG%208%20Statement%20with%20Oceans%20and%20Seas%20Draft%20SDG%20Annex%20(1).pdf

3 https://sustainabledevelopment.un.org/content/documents/6075india.pdf

4 Several issues concerning SDG-14 are given prominence in other SDGs, thus undermining the relevance of SDG-14. It is observed that some of the important issues are discussed in SDGs 8, 12,

13, 15 and 16 (German Council for Sustainable Development, 2015).

[5] Sea Around Us (2016), http://www.seaaroundus.org/

[6] Data Source: http://www.fishbase.org/search.php, 2015

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Blue Economy as Emerging Development Paradigm: A Policy Framework for IORA

V. N. Attri*

Introduction

The emerging development paradigm of Blue Economy that nests the essential features of ocean economy, green economy, coastal economy and marine economy seems to possess a great potential for higher GDP growth in the Indian Ocean Region. Blue Growth focusing on the long-term sustainability of oceans has become a realistic policy frame within Indian Ocean Rim Association (IORA) during the last two years. Oceans are essential to human life as they provide food, nutrition and income for millions of people, and act as highways to global trade. Technological innovations are paving the way for deeper interactions of human beings with the oceans. It drives economic growth and brings enormous benefits to the society. Approximately, 350 million jobs are linked with the oceans and international trade in fish products spans across 85 nations and worth US$102 billion per annum.[1] Potential economic value from coral reefs in the Philippines is estimated around US$ 9 billion (Chou et.al, 2002). Blue Economy advocates similar outcome as the green economy, namely improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. This policy brief provides an account of the ongoing developments on blue economy in the Member States of IORA with a view to recommend a policy framework for achieving sustainable development in the Indian Ocean region.

Principles of Blue Economy

Blue Economy is slowly emerging as a development paradigm in the IORA region. The core principles of Blue Economy are to maximize economic gains from marine resource use and ensure environmental and ecological sustainability.[2] Academia, business groups and governments are putting their minds to settle broad sectors of Blue Economy. The main factors that govern the success of Blue Economy are: Good Governance, Technology, Resource Management, Monitoring & Surveillance, Institutional and Regulatory Reforms (see Figure 1).

The questions that need to be answered in order to implement the Blue Economy are: estimation of the size of the blue economy, nature of risks involved, understanding of investment opportunities in the oceans, available capital for investment and scaling up of blue industries. In order to answer these questions, it is imperative to evolve a national accounting framework within IORA. In some countries Blue Economy plays an important role like USA, China, South Korea, EU, Australia, Canada, France, the United Kingdom, Ireland and the Philippines. The importance of measuring the contribution of the Blue Economy to the gross domestic product of a country is viewed with utmost priority.[3]

Within IORA two member states including Mauritius and Seychelles have made substantive progress on sensitizing the merits of blue economy. In Mauritius, ocean economy has been identified as one of the pillars of economic development that will lead to its transformation into a high income economy by 2025. At present, Blue Economy contributes to around 10 to 11 per cent of its gross domestic product. On the other hand, Seychelles has a separate Ministry of Finance, Trade and Blue Economy. Highlighting the

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Figure 1: Factors Governing Success of Blue Economy

importance of ocean development, a budget of SCR 796.5 million (US$58.8 million) has been approved by the Government of Seychelles in December, 2016 for the year 2017. These selected policies are important for promoting ocean development for encouraging Blue Economy activities in the country.

Coverage of Blue Industries

The ecological health and economic productivity of marine and coastal ecosystems can be enhanced by shifting to a more sustainable economic paradigm that taps national potential of IORA countries ranging from generating renewable energy and promoting eco-tourism to sustainable fisheries and transport. At the global level, the potential economic gains from reducing fishing capacity to an optimal level and restoring fish stocks[4] is in the order of US$50 billion a year. Apart from fishing, there is ample potential for harnessing renewable energy in the Indian Ocean Region. According to the Inter-governmental Panel on Climate Change, the technically exploitable potential for marine- based renewables excluding offshore wind would reach 7400 exajoules per year, exceeding the current global energy needs. However, marine-based renewable energy represented less than 1 per cent of all renewable energy production in 2008. Marine-based renewable energy also carries significant potential for green job creation. This will involve the transition from a conventional economy to a Blue Economy. This could be a big economic and investment opportunity, but there are great risks and challenges. A new and intensive phase of economic activity in the oceans needs to be linked with the scientist's warnings as seas are facing unprecedented pressures from human beings with their over-exploitative activities. The gap between economic activity and ocean health needs to be bridged soon; otherwise 'Blue Speak' in terms of a sustainable ocean economy may recede rather than advance or flourish for common good.

Economic activities in the oceans are expanding rapidly driven primarily by global population growth, economic development, trade, rising income levels, climate and environment, and technology. Looking to 2030, many ocean-based industries have the potential to outperform the growth of global economy as a whole, both in terms of value added and employment. The projections suggest that between 2010 and 2030 on a "business-as-usual" scenario basis, the ocean economy could more than double its contribution to global value added, reaching over US$3 trillion. In particular, strong growth is expected in marine aquaculture, offshore wind, ship building and repairs, port activities and seafood processing sectors. Ocean-based industries

identified as traditional and emerging are presented in Table 1.

Coastal and marine areas support a wide variety of traditional industries such as shipping, fisheries and coastal tourism, and technological advancement makes it possible to access new resources through emerging industries such as renewable energy, marine aquaculture, offshore wind energy, marine biotechnology and seabed mining. These Blue Economy industries contribute significantly to creation of employment opportunities and economic output.[5] It is to be noted that these industries vary from one county to another. The industries mentioned above contribute roughly US$1.5 trillion (2.5 per cent) to global gross value added. Calculations on the basis of the OECD's Ocean Economy Database value the ocean economy's output in 2010 (the base year for the calculations and subsequent scenarios to 2030) at US$1.5 trillion in value added, or approximately 2.5 per cent of world gross value added.[6] The Blue Economy industries contribute some 13 million full-time jobs in 2010 constituting around 1 per cent of the global workforce (and about 1.5 per cent of the global workforce actively employed). Blue Economy for the next 20 years is being driven primarily by developments in the global population growth, urbanization and coastal development.

Initiatives by IORA Countries

There are some common concerns faced by the IORA countries with regard to ocean resources management. Some of those including sea level rise; climate change; sea-borne terror; piracy; natural disasters like tropical storms, droughts, tsunami, cyclones, etc; land degradation; coastal erosion; illegal, unreported and unregulated (IUU) fishing, and degradation of mangroves and sea grass are viewed as immediate threats to Blue Economy in the Indian Ocean region. Along with country initiatives, the best way to promote and develop Blue Economy in the region is to adopt a sub-regional approach; initiating development cooperation among the like-minded member states who have been able to identify common areas of interests. IORA countries have unilaterally taken a number of concrete steps to develop Blue Economy in their economies. The initiatives undertaken by select member states such as India, Mauritius, Seychelles, Bangladesh and Indonesia in the areas of capacity building and technical cooperation are presented in Table 2.

Conclusion and Policy Recommendations

The success of Blue Economy in the IORA is contingent upon two integral components: - a paradigm shift in thinking concerning the vitality and potential of ocean resources and mainstreaming of Blue Economy activities in national economic policy. Specific policy measures incorporating the above mentioned two components may be adopted by the IORA countries to kickstart Blue Economy in the region. The bilateral cooperation initiatives taken by India, Mauritius, Seychelles, Thailand and Bangladesh for the promotion and strengthening of Blue Economy may be extended to the sub-regional and regional levels. Certain sectors of Blue Economy such as fishing & aquaculture, ocean renewable energy, coastal tourism, ports & shipping, deep sea mining, marine biotechnology and marine services can be considered as priority sectors for the IORA

Table 1: Ocean-based Industries

Traditional	Emerging
Capture Fisheries	Marine aquaculture
Seafood Processing	Deep-and-ultra-deep water oil and gas
Shipping	Offshore wind energy
Ports	Ocean renewable energy
Shipbuilding and Repair	Marine and seabed mining
Offshore oil and gas (shallow water)	Maritime safety and surveillance
Marine manufacturing and construction	Marine biotechnology
Maritime and coastal tourism	High-tech marine products and services
Marine business services	Others
Marine R&D and education	
Dredging	

Source: OECD (2016).

Table 2: Policy Initiatives on Blue Economy by IORA Countries

Country	Measures
India	• Niti Aayog initiated a consultation process for integration of defense and internal security with a 15 year vision. • Niti Aayog started discussion to leverage India's status as a Maritime Nation with a long coast line and the potential to become a significant Blue Economy. • India is keen to jointly promote Blue Economy in collaboration with Mauritius, Seychelles, Sri-Lanka and Maldives (Likely to be IORA Member, focusing on environment and ecology). • Aims to help increase Africa's maritime capabilities through "sagarmala" project focusing on coastal area development, port infrastructure buildings, connectivity and sea-bed capacities, sea-air transportation, fisheries, marine sciences, renewable energy and hydrography. • Research and Information System for Developing Countries (RIS) has been engaged in encouraging Blue Economy in India and the region through Blue Economy Dialogues and workshops. With the support of the Ministry of External Affairs, RIS organised two Blue Economy Dialogues with IORA member countries at the 1.5 track level since 2015. • RIS has also formed Blue Economy Forum (BEF) in 2017 which aims at fostering open dialogue and knowledge sharing in Blue Economy activities through lecture series, policy briefs, discussion papers, etc.
Mauritius	• Government of Mauritius has established a separate ministry for marine resources, fisheries, shipping and ocean related activities. • DOWA obtain valuable resources through the deep sea waters by making use of the coldness and nutrient rich properties to develop commercial activities. There are currently two DOWA projects in Mauritius based near the airport and port which will be implemented in July 2017 for downstream projects. • Fisheries Training and Extension Centre (FITEC) invests in training programmes to educate local fishermen in various fields such as fish handling. • Mauritius has adopted 'a plastic bag-free Mauritius' scheme. • University of Mauritius organized a capacity building workshop on the ocean economy on Tuesday, 1st of September 2015. • The Budget of Mauritius 2016-17 makes a provision to contribute to the Blue Economy programme by developing aquaculture and incentives for setting up infrastructure for fish processing. • Two studies are being concluded with regard to generating electricity through ocean waves and offshore wind. • A Memorandum of Understanding will be signed with the National Institute of Oceanography, Goa for the setting up of a world class Research Institute of Oceanography in Mauritius. • As regards the fisheries sector, a total of Rs 20 million has been earmarked for the acquisition of a multi-purpose vessel which will be used for research, surveys and training of fishermen and skippers. • A grant of 50 per cent up to a maximum of Rs 4 million, will be made available to cooperative societies to acquire semi-industrial vessels. Provision is also being made for Rs 12.5 million to finance the purchase of 10 floating cage structures to Fishermen Cooperatives to promote small-scale aquaculture. In a bid to provide shelter for approximately 120 fishing vessels the Mauritius Ports Authority will undertake the construction of breakwaters at Fort William. • A new incentive scheme comprising an 8-year tax holiday will be offered to attract industrial fishing companies to operate from Mauritius and contribute to the development of seafood hubs. To address the human resources constraint, the Mauritius Maritime Training Academy will increase its intake by 50 per cent to bring it to 1,200 trainees annually. • The Mauritius Ports Authority (MPA) launched in December 2016 a project named 'Tree-Planting Month' as part of their ongoing projects to make the harbor in the capital city of Port Louis a Greener Harbour. This initiative is focused towards the "Embellishing and Greening Mauritius, Africa and Planet Earth" Campaign of the Ministry of Environment, Sustainable Development, and Disaster and Beach Management.

Seychelles	• The Government of Seychelles is embracing Blue Economy as a framework with main goals of food security, economic diversity, creation of jobs, and sustainable management of the marine environment. • Under the current 'National Development Strategy' and the 'Seychelles Sustainable Development Strategy' (SSDS), 2012–20, fisheries and marine resources have been identified as the most important keys that must underpin all future development in Seychelles. Projects such as Fisheries Management Plans and Aquaculture Master Plan are being developed to contribute toward the national development process.
Bangladesh	• Bangladesh organized the first ever international workshop on Blue Economy in Dhaka in September 2014. • Bangladesh has established 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 – the maritime pillar of the future strategy –emphasizes upon promoting smart, sustainable and inclusive growth and employment opportunities in the country.
Indonesia	• The Government of Indonesia has implemented district level programs for shrimp and seaweed aquaculture and grouper &lobster mariculture. • The Government has committed to creating a Blue Economy Zone with integrated land- and ocean-based development, applying integrated coastal management (ICM) with pilot projects on the islands of Bali and Lombok.
South Africa	• In October 2014, "Operation Phakisa", a maritime project aimed at specifically unlocking and developing ocean economy, was imitated with the objective to promote economic growth and jobs in the country in four priority sectors including maritime transport and manufacturing activities such as coastal shipping, transshipment, boat buildings, repair and refurbishment; offshore oil and gas exploitation; aquaculture and marine protection services, and ocean governance. • Creation of coherent maritime system achievement agenda – 2063 of African Union.

Source: Author's compilation.

region. The primary economic goal of Blue Economy in the regional economies should focus on job creation. For systematic assessment of the size of blue economy in the region, a joint study group may be constituted by the IORA countries for developing a proper accounting system for recording blue economic activities. Blue Economy policies should be holistic and inclusive so as to realize the benefits of untapped ocean resources for higher economic growth and development. Universities in the region may offer specialized academic programmes on blue economy for creating the skill pool to be required by the blue industries. In addition, capacity building programmes in fishing, mining, drug development & pharmaceuticals, tourism and other areas may be conducted from time to time. The major barriers facing some emerging blue industries particularly SMEs such as lack of finance, lack of entrepreneurship and regulatory uncertainty need to be effectively addressed through a coordinated regional framework.

Endnotes

[1] See OECD (2016).

[2] Mohanty, Dash, Gupta and Gaur (2015) present the essential features, definitions and methodologies for measurement of blue economy in great detail.

[3] Colgan (2016) is of the opinion that the measurement of sustainable blue economy will depend as much, or more, on building the capacity to undertake that measurement, as it will depend on resolving the theoretical, empirical, and practical issues.

[4] Currently, 32 per cent of global fish stock is estimated to be overexploited, depleted or recovering from depletion.

[5] See UNCTAD (2014) and Morrissey et al. (2010) for more details.

[6] See OECD (2016).

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