



Commentary

Blue Economy Mission: India's Focus

Ninawe A^{1*} and Indulkar ST²

¹Department of Biotechnology, Govt. of India, New Delhi, India

²College of Fisheries (Dr. B. S. Konkan Agricultural University), Ratnagiri, Maharashtra, India

Commentary

Oceans are one of the high priority areas for sustainable development and therefore invited the attention on depletion of fish stocks, conservation of marine biodiversity, ocean acidification, destruction of habitats and occurrence of alien invasive species [1]. Globally, there has been increasing interest in economising the revenues from oceans. 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, the 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. The Indian Ocean nations have capability to build skills and knowledge to underpin sustainable blue economic growth and sustainabilities. The sector is growing well and has capabilities for maintenance of the ecosystem. In blue economy, maritime transport is the backbone at global level accounting over 80% of world trade amounting for an excess of 10 billion tonnes for the oil production [2,3].

Indian Ocean Rim region is gaining increasing interest since it has wide variety of biodiversity resources ranging from mangroves, coral reefs and sea-grass beds to deep oceans which provide economic value products and high nutritious food. It also has great potential for economic growth, employment and sustenance of livelihoods. In the Indian Ocean, fish production is very high from the estuarine and pelagic zones. Present efforts are confined to marine products including minerals and metals and other non-living resources. In the developmental activities, the focus is likely to be extended to the maritime region for providing shipping services and infrastructure development

***Corresponding author:** Arun Ninawe, Department of Biotechnology, Govt. of India, New Delhi, India, Tel: +91 9868255197; E-mail: ninawe@gmail.com

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on land, mechanised floating ports, geo-engineering and inland waterways, thereby, obviating the need for trucks or railways [4,5].

The ocean economy also supports goods and services and helps half of the world's population living within 100 kilometers of the coast [6]. The National Ocean Economics Program study estimated that ocean economy created over 2.7 million jobs and had revenue contribution of USD 258 billion to the GDP of the United States [7]. The global ocean economic activity development was projected between \$3 trillion and \$6 trillion [8]. The human relationship with the ocean is changing and adapting to respond to new demands, ecological needs, and the dynamics of global climate change. The ocean sustainable development goal suggests conservation and sustainable use of the oceans, seas and marine resources to particularly benefit the small island developing states and least developed countries [9,10]. The diverse Indian ocean region is important global geopolitical focal area and is expected to have higher outcome with healthier efficient management of maritime activities. The potential is immense and it is highly productive to meet both current and future human needs with proper sustainable efforts.

Blue biotechnology plays a critical role in unintended extraction of marine species applied to biotechnologies, nanotechnology, biomaterials and the introduction of genetically modified fish. The blue economy communicators work with ocean data base systems to maintain data base, software tools, and models. A vision document on blue economy vision 2025 proposed harnessing business potential for India and international partners on sustainability of ocean resources for economic benefits. Blue economy as an agenda for economic growth can contribute to the sustainable use of natural resources for job creation, encourage innovation, and provide opportunities for knowledge-based businesses. The key strategy would involve stakeholders, business, industry, academia, experts and civil society for its sustenance and development. Biotechnology has been a highly promising sector during the last three decades and has quickened the speed of expansion of the Biotechnology industry in India. In India, the bio economy has been projected at USD 100 Billion by 2025 to be accomplished by partnering with the Central and State agencies with focus on blue economy by addressing best policies and regulations encouraging investments and entrepreneurship with active cooperation and joint partnerships between the academia and business institutes. This could also act as platform for the sustainable utilization of marine bio-resources to promote the growth of India's bio-economy through the mission of blue economy. The other areas include nutrition, nutraceuticals, cosmetics, fisheries by product transformation and the innovative marine molecule sector [11,12]. Therefore, ocean based marine resources are the next sunrise industry for sustenance of livelihoods and human welfare.

Food and Agriculture Organization (FAO) has made an assessment of the world oceans and came to the conclusion that the resources are almost at the stage of depletion. However, the Indian Ocean resources have good potential for exploitation and exploration of high production and productivity. The Indian Ocean is blessed with rich polymetallic nodules and sulphides mineral resources which are

typically found at four to five km in water depth and has received good attention for exclusive rights for its exploration [13,14].

Thus, the overall focus of blue economy activities is dependent on oceanic and marine resources covering aquaculture, maritime tourism, ocean energy, marine mining, offshore oil and gas explorations etc. In the 21st century, global initiatives are being taken on blue economy by countries viz. Australia, European Union and China [12]. This is to take advantage of our unutilized marine and coastal resources for increasing production and productivity from aquatic and ocean ecosystem. The focus on coastal security, economic and environment activities are given in collaboration with the neighboring nations.

India has a coastline of above 7,500km, spanning into nine maritime States and two Union Territories (UTs) in the mainland, and two islands with 12 major and 187 non-major ports, which play crucial role in sustaining growth for trade and commerce. The largest coastline supports various enterprising activities in inland waterways and ports [15]. The blue economy supports 95% business with sea transportation, oil and petroleum resources using Indian Ocean as the economic hub. Although the Indian Ocean is endowed with rich wealth of natural resources, it is yet to be fully tapped for economic development and for harnessing high value products and processes [16].

India's Exclusive Economic Zone (EEZ) extends to 2.02 million sq km and the continental shelf area to 0.18 million sq km. The Indian coast supports about 30% of 1.25 billion Indian populations and the eco-system is known for high biological productivity of rich fauna and flora. Maximum exploited marine fisheries resources from the coastal area have been reported from the present fishing grounds up to 200m depth. However, due to urbanization and anthropogenic activities, the coastal fisheries are being faced with several threats due to indiscriminate fishing, habitat degradation and pollution. Apart from its major support, it gives emphasis on fisheries, sea energy, ports and naval sea bed, ocean studies and marine biology and biotechnology research. Thus, there lies great potential for marine aquaculture, capture fisheries, fish processing, offshore wind, and port based activities to provide employment. The promising sectors viz. capture fishery and aquaculture, novel marine products of high value drugs, chemicals and bio-products, mineral resources for oil and gas, deep-sea mining and hydrocarbon, renewable energy resources for wave energy projects and offshore wind energy are also on cards [17,18].

Marine biology and biotechnology is 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 from ocean based resources. The Department of Bio-technology has taken initiative to set up the state of art institute on ocean biology and bio-technology to address various marine bio-technology issues and interventions by giving emphasis on research & development. This would address research, education, knowledge exchange programmers including specialized trainings. The promotion of blue economy with ocean resources and conservation would create both challenges and opportunities for new India.

While addressing the blue economy and Indian Ocean region, strategic importance is given to economic growth with country's oil

and gas imports through the sea, with emphasis on Sagarmala project launched by the Ministry of Shipping, for port-led development through the extensive use of IT enabled services for their modernization. The Union Budget for the financial year 2017-18 increased its allocation by giving impetus to the port-led development especially for the ship-building industry to benefit from a major port thrust as the industry has high multiplier effect on investment and to accelerate industrial growth through ocean based resources.

Way Forward for India

In the era of advancement of technology, oceans are recognized as new centers of economic activity for significant trade and commerce in the fields of shipping, offshore oil and gas, fishing, undersea cables, and tourism. Besides these areas, there are other emerging industries such as aquaculture, marine biotechnology, ocean energy and sea-bed mining that have the potential to create jobs and spur worldwide economic growth. The Indian Ocean region needs sustainable and inclusive frameworks for international partnerships for the economic growth, employment and sustenance of livelihoods. The steady growth of Indian fisheries over last four to five decades has been largely due to outstanding annual growth of 6-7%. Such outstanding increase is instrumental in placing the country as the second largest fish producer in the world. The total fish production from the country during 2017-18 is 12.4 million tonnes with large share of aquaculture production (7.2 million tonnes). The coastal shrimp aquaculture has been a major driver to the country's seafood export of over Rs. 45000 crore during 2017-18. Even though the shrimp aquaculture and freshwater carp culture are growing, non-availability of quality seed remained as the major constraint for aquaculture diversification over these years, it is expected that the assured seed availability through commercial seed production. India's research capabilities in modern marine biology are vast and the focus is given on basic and applied research in marine biology, ecology and marine biotechnology. The multidisciplinary science can emphasize on the production of most needed novel bio-molecules and processes for therapeutics, enzymes, hormones, bio-plastics, metabolites etc. Therefore, from the Indian perspective, in the marine capture sector, improvement must be in the following major areas as a matter of priority.

- Ecosystem based fisheries management with co-management and knowledge management as a part of major reforms in sector governance is needed.
- Developing a detailed coastal zone management plan for sustainable coastal aquaculture development.
- Addressing waste accumulation in the coastal and inshore area threatening the marine ecosystem and affecting fisheries production.
- Introducing updated fish production technology as a large gap is existing between the technology available and accessible to fish farmers.
- Cold chain development needs to be established in all major production centres.
- Domestic food safety standards should be implemented to ensure delivery of quality products to consumers.
- Fish processing centres and value added product processing units need to be promoted based on market demands.

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