



## Synchronizing India's Maritime Security and Blue Economy: A Sustainable Development Approach

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### ABSTRACT

In the evolving maritime geopolitics in the Indo-Pacific, India's strategic location in the region is significant for maritime governance, economic security and regional stability. Its regional and global importance is important for maintaining good order at sea, securing national objectives and interests in the Indo-Pacific. Notwithstanding its strategic significance, many observers were of the opinion that India's naval and maritime potential is underexploited. This further pushes for the narrative to have a holistic approach combining security and economic goals. This paper, therefore provide a detailed analysis of India's maritime security framework and how the development of its blue economic capability is seen through the perspective of the principles of sustainable development. It also makes an attempt to scrutinize how the blue economy supports economic growth and preserves marine ecosystems. The study thus identifies important challenges that India is facing in developing its blue economy and therefore needs to bring into line maritime security with blue economy initiatives.

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### 1. Introduction.

In the evolving geopolitical scenario of the Indo-Pacific, India's importance in the Indian Ocean has increased manifold. India's economic growth, naval presence and its image as a net security provider in the region are accepted and respected. India's geostrategic location in the Indian Ocean further enhanced its strategic reach to major chokepoints such as Bab el Mandeb, Malacca Strait, Strait of Hormuz and as far as the Suez Canal. With such spear of maritime influence, India plays an important role in protecting the basic freedom of navigation and maritime security. This is further evident in the Indian Navy's official document, "Ensuring Secure Seas: Indian Maritime Security Strategy," published in 2015. This document reiterates India's dedication to strengthening its maritime strategic presence in the Indian Ocean region.

In history, K. M. Panikkar (1945), in his famous book, highlighted the significance of the Indian Ocean to India's security, economic prosperity, and the expansion of its trade and political freedom and stability. The 26/11 Mumbai terror attacks brought into lime light the security and strategic loopholes in India's security calculus and in the mindset. This act was critical to assess the holistic maritime security and to strengthen maritime security across the peninsula. The terror attack certainly addresses the emerging security threats and thus emphasizes the need to comprehend the link between maritime security and sustainable development.

New Delhi's maritime security goals center on two broad areas. First, to safeguard its interest in the immediate waters (Exclusive Economic Zone) and second, in the extended maritime space (maritime borders, and order in the sea). In the extended maritime space, maritime piracy remained the concerns and thus required urgent order in the high seas. Since 2008, the Indian Navy has carried out tremendous tasks against piracy in the Horn of Africa and the Gulf of Aden maritime corridor. This is evident from the stats that by June 2019, India had deployed 73 naval ships, which successfully escorted 3,784 merchant vessels and also arrested 120 maritime pirates (Peri,

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2019; Indian Navy, 2019).

Amidst these developments, the People's Republic of China's ascendancy through its economy and military began to shape the discourse in the Indo-Pacific. From the South and East China Seas to the western Indian Ocean region, Beijing's strategic reach shapes India's Maritime strategy. Further, the Quadrilateral Security Dialogue (Quad) of India, the US, Australia and Japan began to counter hegemonic China. Their concerns were visible in promoting maritime stability, regional economic collaboration and the freedom of navigation.

Therefore, this research paper provides a detailed analysis of India's maritime security framework and how the development of its blue economic capability is seen through the perspective of the principles of sustainable development. It also makes an attempt to scrutinize how the blue economy supports economic growth and preserves marine ecosystems. The study thus identifies important challenges that India is facing in developing its blue economy and therefore needs to bring into line maritime security with blue economy initiatives.

## 2. Research Methodology.

A qualitative research method approach is adopted for this study. This approach offers a comprehensive and multidimensional perspective on India's maritime security and blue economy. This method helps to examine complex questions from multiple perspectives, such as economic, environmental, geopolitical and policy. Thus, through this method, the content will be analysed. The concept of sustainable development and maritime blue economy will be assessed in detail.

## 3. Comprehensive overview of India's Maritime Security.

India's maritime security canvas covers the Indian Ocean in its immediate sphere of influence and in the broader sense, the Indo-Pacific region. As argued earlier, these regions are vital for its economic growth, navigation freedom and certainly for its political stability. In this context, the Indian Navy plays a significant role as a tool of diplomacy in the foreign policy by supporting government efforts in the maritime domain. The Indian Navy's goal is to protect and defend India's national interest and sovereignty at sea from states and non – state actors. In recent times, threats have emerged in many forms such as maritime piracy, maritime terrorism, illegal fishing, maritime pollution, maritime safety, climate change, natural disasters and illegal trafficking of arms, drugs and humans. Each of these creates a significant challenge for New Delhi's maritime ambitions and security.

To tackle these non-traditional threats, India needs to develop a strong maritime surveillance security system, which involves improving national surveillance, building cooperative partnerships, and enforcing maritime laws. In this scenario, small island states in the Indian Ocean are important factors and thus working with the Maldives, Seychelles, Mauritius and Sri Lanka displays New Delhi's dedication to the regional security canvas and diplomacy. In addition, India's strategic partnership

with the US, Australia, Japan and France further enhances its bilateral and multilateral efforts in the maritime domain.

Further, New Delhi's maritime security is closely linked to its geographic and economic positioning in the Indian Ocean. The large oceanic space adds to its reliance on the resources in the region. These resources, therefore have enormous potential for its vibrant blue economy. Murlidharan (2019) thus observed that 90% of its trade in volume and 70% in value are moved through the strategic sea lanes of communication (SLOC) and this has fundamentally raised the need to increase the standard of protection for its economic interest.

In this context, the Indian Navy has been consistent in the formulation of its forward presence. It's operational readiness by protecting national interest and enhancing its strategic depth through various operations in the Indian Ocean region. Examples include its quick action during the 2004 tsunami, civilian evacuation during the 1990 Gulf crisis, 2006 Operation Sukoon during the Lebanese crisis, 2015 Operation Raahat during the Yemen Crisis and during the Covid-19 pandemic, Operation Samudra Setu of 2020.

Post Galwan border clash in eastern Ladakh, the Indian Navy, based on its operational deployment, deployed its frontline warship in the South China Sea. Many observers and experts believed this decision had significant implications for China, primarily because it demonstrated India's growing naval strength and its ability to operate in the Chinese backyard.

Therefore, to conclude, the Indian Navy has a broad spectrum of operations in the Indo-Pacific, spanning economic security to military security, enforcing national policy and protecting sovereignty. At the same time, being a net security provider, it shapes its maritime future in the region. Thus, it boosts its blue economy by enabling a safe and sustainable development approach to utilising marine resources such as fisheries, marine biotechnology and renewable energy.

## 4. Nurturing India's Blue Economy through the Lens of Sustainable Development Theory.

The application of the blue economy and its concept has gained a lot of momentum in the policy circle, education and in the academic discussion. Yet the concept varies from definition, including practices and sectors.

Admiral Sunil Lamba, the former chief of the Naval Staff, during the 2017 Maritime Power Conference, defined the Blue Economy as marine-based economic growth (Banerjee, 2018). The World Bank (2017) defined the Blue Economy as a way to encourage economic growth, social inclusion and improve livelihoods. The United Nations (n.d) states the ocean as a developing space, which blends conservation, sustainable resource utilization, energy generation, and marine transportation. These definitions highlight the significance of the blue economy due to its multifaceted nature.

According to Banerjee (2018), India's blue economy spans across lakes, rivers, coasts, seas and oceans, promoting sustainable development by uniting ecological, environmental and industrial interests. Additionally, Singh (2021) observes that maritime transport is a critical factor in India's economic progress,

as 95% of its trade is carried by maritime transport. This makes about 4% of GDP (PHD Chamber of Commerce and Industry, 2023).

These observations certainly bring clarity that the blue economy has a crucial role in economic development. It is further evident that the blue economy is aligned with the sustainable growth of coastal economies, communities, ecological health and industrial development. The Brundtland (1987) commission concept aligned with sustainable development, which drew attention to fulfilling current needs of the people without destroying the rights of future generations to the resources. In this context, India's maritime blue economy demonstrates this approach of sustainable utilisation of ocean resources to enhance its economic growth with equitable participation and distribution of resources among the people and stakeholders.

The United Nations (1992) Conference on Environment and Development (UNCED) defines sustainable development as the incorporation of economic growth, social inclusion and environmental protection. India's blue economy represents this approach by enhancing its economic sectors such as shipping, fisheries and marine industries for social inclusion by empowering coastal communities and safeguarding the local coastal environment by adopting sustainable ocean management.

Daly (1996) emphasizes that sustainable development prioritizes human well-being over resource exploitation. In the Indian context, its maritime strategy in blue economy promotes marine livelihood, innovation and eco-tourism, ensures sustainable resource utilisation and reduces issues like overfishing, marine pollution and habitat loss. Similarly, Pearce et al (1989) were of the opinion that maximising economic benefits with preservation of natural resources further enhances and strengthens India's commitment to sustainable development. Thus, the application of these principles exemplifies a balance between economic growth, environmental protection and social well-being.

#### 4.1. Economic Growth – Harnessing Ocean – Based Industries.

India's economic growth is embedded in sustainable long-term priorities and prosperity by balancing its development agendas with environmental stewardship. In this process, its promotion of green industries, circular economies, and renewable energy encourages inclusive development, enhances global competitiveness and resilient infrastructure. In tune with this, the Ministry of Port, Shipping, and Waterways (2024a) launched the Sagarmala Project. The Sagarmala project is rooted in modernisation of port infrastructure, enhancing and building connectivity, streamlining logistic costs and building resilience in the maritime supply chain. Also, the National Action Plan for Green Shipping promotes sustainable development goals by encouraging eco-friendly marine practices, contributing incentives for low-emission ship and aligning India's maritime sector with environmental consciousness (Press Trust of India, 2023).

Moreover, the Maritime Amrit Kaal Vision 2047 has seen a positive allocation of over ₹80 lakh crore for investment in the critical sector of blue economy such as logistics, infrastructure and shipping (Press Information Bureau, 2024b). The ultimate

aim of this vision is to build efficient resilient maritime supply chain, with strong commitment to sustainable utilisation of the blue economy. These developments certainly demonstrate New Delhi's commitment and focus on harmonizing its economic growth and development with that of environmental responsibility.

#### 4.2. Environmental protection – Preserving the Marine Ecosystem.

India's maritime environmental efforts believe in sustainable development, promotion and conservation - focused economic policies. Such policies support the idea of balancing ecological preservation with economic expansion, particularly in the maritime sector. In 2023, the government of India pledged to protect 30% of its marine and coastal ecosystem by 20230, which is in line with international biodiversity goals (Press Trust of India, 2024). Under this initiative, the focus is on pinpointing coastal zones with risk factors and limiting any human activities that could cause harm and adverse effects.

Additionally, the National Action Plan for Green Shipping encourages environmentally approachable maritime practices by offering incentives for low-emission ships, that aims to lower the carbon footprint (The Hindu Bureau, 2023). In this direction, India's mangrove cover has positively increased to 4,999 square kilometers, which is an increase of 17 square kilometers since the last recorded assessment. This certainly shows positive conservation progress in India's maritime domain (Press Information Bureau, 2022). Holistically, these developments demonstrate India's balanced approach to sustainable development, aligning with its marine biodiversity and economic goals. This further enhance to build resilient and thriving ecosystem for future generations.

#### 4.3. Social Well-being – Inclusive Development for Coastal Communities.

In the social well - being of the coastal communities, the important aspect of sustainability is rooted in the socio-economic equality, equity, preserving livelihood security and building coastal communities' resilience. According to Dhima et al. (2016), around 250 million people are living within 50 kilometers of India's coastline. These residents depend on maritime resources for an easy protein source, such as fisheries, recreational activities like tourism and certainly on trade for their livelihood. Thus, inclusive development for coastal communities is essential for promoting inclusive socio – economic growth.

Additionally, in this context, the project Sagarmala is promising as it is dedicated to inclusive maritime growth, focused on port upgrades, enhancing and improving connectivity and building coastal community resilience. In this situation, the Ministry of Port, Shipping and Waterways (2024b), has undertaken an ambitious 81 project valued at ₹11,573 Cr.; out of which 21 of these projects (₹1,559 Cr.) are finished and 32 (₹6,166 Cr.) are currently underway at various completion stages.

A significant milestone of this project under the social well-being is the skill development of the coastal communities. The

Ministry of Rural Development, through the Deen Dayal Upadhyaya Grameen Kaushalya Yojana Sagarmala Convergence Programme has trained 1,978 people (Ministry of Port, Shipping and Waterways, 2024b). Such programme and initiatives are aligned with ecological, economic and social balance. Further community participation, particularly Indigenous knowledge and government flexible policies, support the very cause of Sustainable Development Goals. This enhances India's coastal communities and their well-being, fostering resilience, growth and environmental protection.

## 5. Tenets defining India's Blue Economy.

India's blue economy is built on core principles such as fisheries, marine biotechnology, renewable energy, deep – sea minerals exploration, shipping and ports and coastal eco-tourism.

### 5.1. Fisheries.

Fisheries are an important sector in India's maritime blue economy. It contributes 1.07% to India's GDP and employs 16 million people (Dey, 2020; Kumar, 2020). Indian fisheries make up 7.56% of global fish production, ranking second in aquaculture and third overall in fisheries (Press Information Bureau, 2021). According to Sinha (2024), the Pradhan Mantri Matsya Sampada Yojana (PMMSY) initiative plans to boost the fish production to 22 million metric tons by 2024 – 2025 by encouraging sustainable fishing practices. Additionally, sustainable aquaculture methods like Recirculatory Aquaculture System (RAS), Biofloc technology and Integrated Multi-trophic Aquaculture (IMTA) help lessen environmental impacts (Tom et al, 2021). Additionally, blue carbon initiatives like restoring mangroves and seagrass improve fish habitats. Therefore, sustainable management of fisheries promotes long-term economic growth, helps preserve the marine ecosystem and continues to enhance the sustainable livelihood of coastal communities.

### 5.2. Marine Biotechnology.

Marine biotechnology has emerged as an important pillar of India's blue economy. It is this one kind of sector that blends sustainable use of marine resources with employment opportunities and environmental safeguards. This discipline encompasses areas such as pharmaceutical research, material science, bioremediation, marine biomedical studies, genomics and molecular genetics (Ambrosina et al, 2019). Further, this sector is economically promising as it is expected to reach US\$8.74 billion by 2026 and will further grow to US\$11.5 billion by 2023 (Global Industry Analysts, 2022; Global Industry Analysts, 2023). In addition, the scope of algal biofuels offers a sustainable energy source (Neeti et al, 2023). This further helps to cut greenhouse gas emissions and may reduce India's over-reliance on fossil fuels. Therefore, unlocking the full potential of marine biotechnology needs sustainable practices with a much focus on protecting ecosystems. This also opens up collaborative space among the government bodies and other stakeholders, like the private research organisation sector.

### 5.3. Renewable energy.

In the emerging geopolitics, energy security has emerged as a deciding factor for steady or slow economic growth. India, being an energy-deficient country, needs to secure its energy security for sustainable economic growth. Thus, the renewable energy component of its blue economy becomes an important alternative source for steady economic growth. India's 11,098.81 km coastline and extensive exclusive economic zone offer great opportunities for offshore wind, tidal energy, wave and ocean thermal energy. Thus, India has set the target of 500 GW of non-fossil fuel capacity by 2030 and thus aims to achieve net-zero emissions by 2070 (Press Information Bureau, 2024a; Singh & Saran, 2024).

Furthermore, India aims to reach 30 GW offshore wind capacity by 2030 from Gujarat and an additional 70 GW from Tamil Nadu, which is enough to supply 50 million homes (International Trade Administration, 2023). In addition, the Gulf of Khambhat and the Gulf of Kutch together has the potential for tidal energy of 8,000 MW (Ramakrishna et al, 2016). Thus, a sustainable approach of incorporating ocean-based renewable energy will help lower carbon emissions, improve energy access along the coastline and coastal communities and certainly would generate employment opportunities, making India a frontrunner in marine clean energy.

### 5.4. Minerals.

The Indian Ocean region, and India's exclusive economic zone in particular, has polymetallic nodules and sulphides in considerable amounts. The Ministry of Earth Sciences estimates polymetallic nodule reserve at 380 million tonnes, which also includes 4.7 million tonnes of nickel, 4.29 million tonnes of copper, 0.55 million tonnes of cobalt and 92.59 million tonnes of manganese (Pacha, 2019). In addition, the 'Samudrayan' deep-sea mission of India will further enhance the much-needed research on non-living resources at the depths between 1000 and 5500 meters (Sunilkumar, 2022). Thus, the economic potential of such minerals, along with the deep – sea mining industry, will boost the maritime blue economy of India.

### 5.5. Shipping & Ports.

India's 11,098.81 km of coastline offers huge potential for its shipping and ports. These assets are essential components of its blue economy. India's geopolitical positioning in the Indian Ocean provides it with opportunities to utilize ocean resources. Within this context, the web of Shipping and ports accounts 90% of trade by volume and 70% by value (Muralidharan, 2019). Moreover, the Government of India's project Sagarmala is a boon encompassing 574 projects worth 6.01 lakh crore, which is expected to be executed between 2015 to 2035 (The Ministry of Ports, Shipping and Waterways, 2020). Certainly, the scale of this project would enhance port modernisation, port connectivity, and promote port-linked industrialisation and job opportunities among the coastal communities across India's peninsula.

### 5.6. Coastal Tourism.

The tourism industry plays an important role, contributing 10% to Indian GDP, with foreign tourism surging by 107%, rising from Rs. 65,070 crore in 2021 to Rs. 1,34,543 crore in 2022 (Kujur, 2019; Mint, 2023; Press Information Bureau, 2023). In this context, coastal tourism has significant growth potential because of initiatives like the Government of India's Swadesh Darshan Scheme, which aims to develop 15 thematic circuits. Within this, the coastal circuit would cover 17 locations at a cost of Rs. 77,298.54 lakh of investment (Press Information Bureau, 2019; Ministry of Tourism, 2019). In addition, 'Cruise Bharat Mission' and 'Project Mausam' will enhance cruise tourism and maritime cultural links with 39 Indian Ocean countries (Mishra, 2024; Press Information Bureau, 2015).

Thus, these tenets of India's blue economy would strengthen the country's economic progress, community welfare, ecological health and collective coastal community growth. However, achieving sustainable growth requires balancing resource utilisation with environmental safeguard mechanisms. Therefore, with community participation along with government and non-government stakeholders, with environmentally friendly practices and policies, India can overcome obstacles and ensure sustainable maritime economic development in the blue economy.

## 6. Challenges to India's Maritime Blue Economy.

Challenges to India's blue economy are arising from complex environmental and economic factors.

### 6.1. Environmental challenges.

India's 11,098.81km coastline faces challenges due to climate change, rise in sea level and man-made pollution. According to the World Meteorological Organisation (2023) report, major Indian cities like Mumbai, Kolkata and Chennai are vulnerable. In addition, Mumbai could see a sea level rise of up to 0.12 meters by 2040 and another 0.21 meters by 2060 (Tiwari & Kumar, 2022). These revelations highlight the criticality of strategic planning in India's maritime blue economy to address the impact of climate change on coastal areas, including coastal communities.

Furthermore, marine pollution caused by plastic debris and oil spills threatens the marine ecosystem and overall health of the Ocean, which further affects the fisheries and biodiversity. A study published in the Science Journal, ranks India 12<sup>th</sup> out of 192 countries for its contribution to plastic waste in the high seas, that is, 15 million tons of plastic annually (Kariyawasam, 2021). In addition, 194 sites across the eight states of India are tracked by the Central Pollution Control Board for water quality (Ministry of Environment, Forest and Climate Change, 2023). Thus, given the large maritime space of India, it is inevitable to have an environmental impact on its blue economy. This certainly will create stress on the socio-economic aspects of coastal communities and their dependence on marine resources. However, rising awareness of such issues among stakeholders will bring much-needed change and could build resilience among coastal communities and a mechanism to address environmental challenges to India's blue economy.

### 6.2. Economic Challenges.

The major economic challenges to India's blue economy arise due to overexploitation of marine resources, inadequate infrastructure and widespread illegal, unreported and unregulated fishing. In the Indian Ocean, there has been 300% increase in marine catches, from 1.9 million tonnes in 1950 to 6.5 million tonnes in 2018, demonstrating that more vessels, technologically advanced craft and higher demand in the consumption have led to the overexploitation of marine resources (Zeller et al, 2023). In addition, the fisheries sector alone employs over 16 million people and adds 1.07% to its GDP (Kumar, 2020; Dey, 2020). This highlights the significance of a sustainable approach to conserving marine resources in order to sustain the livelihoods of millions.

Inadequate infrastructure, like ports, is another challenge to India's maritime sector. The increasing congestion, poor hinterland connectivity and insufficient facilities like berths, cranes and navigation equipment remain contagious issues in the Indian maritime infrastructure (Singh, 2017; Mantry & Ghatak, 2017). Additionally, problems like low draft depth, longer turnaround times, extended cargo dwell times, increased dredging requirements and workforce-related delay still hinder the growth of India's maritime blue economy (Mahapatra & Mahapatra, 2018, Koley et al, 2016; Singh, 2017).

And lastly, Illegal, unreported and unregulated fishing in India's maritime domain threatens marine biodiversity. Such activities result in about US\$23 billion in global losses each year (Singh, 2023). In addition, IUU fishing has diminished the fish population, and has disrupted sustainable fishing practices. The magnitude of harm caused to the marine ecosystem is beyond calculation. For instance, the over-exploitation and IUU fishing in the Palk Bay by Indian and Sri Lankan fishermen has done enough damage to the existing fish stocks. If this issue of IUU between India and Sri Lanka is not regulated through an institutional mechanism, then perhaps in the near future, fishermen from both countries may face a severe problem of depleting fish stock. Thus, addressing IUU fishing requires comprehensive regulation and regional cooperation to ensure sustainable fisheries management and ecosystem health.

## Conclusions.

India's maritime blue economy rests on fisheries, marine biotechnology, renewable energy, minerals, shipping, ports and coastal tourism. These sectors are interlinked to each other. Overexploitation of one may cause problem to other. In this critical situation, a sustainable development approach with collaboration with coastal communities, government bodies and non-government bodies like academic, research institutions and industry is essential for ensuring sustainable growth, protecting the environment and maintaining national security.

In addition, fisheries form a significant backbone of India's blue economy, because it support millions of livelihoods and play a critical role in food security. India, being an energy-deficient country, renewable sources of energy from the maritime domain play a critical role in cutting carbon emissions and

securing energy supplies. Further, technological development in the exploration and extraction of seabed minerals, including polymetallic nodules and rare-earth element remains crucial for India's industrial growth. The Shipping industry and port modernisation have a big role to play in India's blue economy. The completion of the project Sagarmala on time will boost and enhance economic growth. Last, but not least, the tourism industry is dynamic in nature, with the existing potential to tap into the marine-based tourism industry with a sustainable development approach will enhance economic prosperity among the coastal communities.

Thus, alignment between India's maritime blue economy and maritime security is essential for guaranteeing the sustainable development of these sectors. By ensuring the protection of maritime zones, countering threats, and promoting international cooperation, India can fully exploit the capabilities of its blue economy while protecting its national interest and environmental sustainability.

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