



**HARNESSING THE BLUE ECONOMY:  
ACHIEVING SDG 14 THROUGH MARINE CONSERVATION AND ECONOMIC GROWTH**

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**Abstract:**

The Blue Economy encompasses various sectors, including fisheries, aquaculture, tourism, renewable energy, and biotechnology, which harness marine resources while ensuring environmental sustainability. By evaluating the impact of marine conservation efforts on entrepreneurship within the Blue Economy, specific entrepreneurship opportunities in marine conservation practices and sustainable resource utilization are identified. The study assesses enabling factors and barriers for entrepreneurship in the Blue Economy, such as policy frameworks and access to finance. Recommendations are provided to promote and support entrepreneurship within the Blue Economy, aligned with the achievement of SDG 14. Findings contribute to the understanding of how entrepreneurship can drive innovation, sustainable practices, and economic growth within the Blue Economy, while preserving marine ecosystems and benefiting local communities.

Q22 - Renewable Resources and Conservation: Fishery; Aquaculture

Q25 - Renewable Resources and Conservation: Water

Q26 - Renewable Resources and Conservation: National Parks, Protected Areas, and Wildlife Refuges

Q27 - Renewable Resources and Conservation: Issues in International Trade

Q28 - Renewable Resources and Conservation: Government Policy

Q56 - Environmental Economics: Environment and Development; Sustainable Development

Q57 - Environmental Economics: Ecological Economics

**Introduction:**

The concept of the Blue Economy has emerged as a key driver for achieving Sustainable Development Goal 14 (SDG 14) - "Life Below Water." SDG 14 aims to conserve and sustainably use the oceans, seas, and marine resources for sustainable development (United Nations, 2015). The Blue Economy refers to economic activities that harness the potential of marine resources while ensuring environmental sustainability (World Bank, 2017), (Lee, Noh, & Khim, 2020). It encompasses various sectors, including fisheries, aquaculture, tourism, renewable energy, biotechnology, and more (FAO, 2016) (Martínez-Vázquez et al., 2021). This introduction explores the importance of harnessing the Blue Economy to achieve SDG 14, emphasizing the interplay between marine conservation and economic growth.

Marine ecosystems are critical for the overall health of our planet. They provide invaluable ecosystem services, such as oxygen production, climate regulation, nutrient cycling, and coastal protection (World Wildlife Fund [WWF], 2015) (Cotas et al., 2023). However, unsustainable practices, overfishing, habitat destruction, pollution, and climate change have severely impacted marine ecosystems worldwide. SDG 14 calls for the conservation and sustainable management of these vital ecosystems (United Nations, 2015).

At the same time, the oceans and seas offer tremendous economic potential. According to the World Bank, the ocean economy has the potential to double its value to \$3 trillion by 2030 (World Bank, 2017). The Blue Economy presents an opportunity to harness this economic potential while ensuring the long-term sustainability of marine resources and ecosystems (Niner et al., 2022) Asian Development Bank Institute. (2022). By promoting responsible and sustainable practices, the Blue Economy can contribute to poverty eradication, job creation, food security, and economic resilience in coastal communities.

To achieve SDG 14 and effectively harness the Blue Economy, a holistic and integrated approach is needed. This approach should prioritize marine conservation, sustainable resource management, and the inclusion of local communities and stakeholders. Conservation measures, such as the establishment of marine protected areas, sustainable fishing practices, and the reduction of marine pollution, are crucial for preserving biodiversity and ecosystem integrity. Additionally, integrated coastal zone management strategies can help balance economic activities with environmental considerations (WWF, 2015).

Blue Entrepreneurship (White, S. 2017) plays a pivotal role in driving innovation and sustainable growth within the Blue Economy. By fostering entrepreneurship, we can unlock new opportunities, technologies, and business models that align with SDG 14. For instance, entrepreneurs can develop sustainable aquaculture practices, create eco-friendly tourism initiatives, or invest in renewable energy solutions such as offshore wind farms or wave energy converters (Wilson et al., 2010) (Akar & Akbaş Akdoğan, 2016)

(Olsen & Chuenpagdee, 2019). These entrepreneurial endeavors can generate economic value while minimizing negative environmental impacts.

Furthermore, the involvement of local communities, indigenous peoples, and small-scale fishers in the Blue Economy is crucial for ensuring equitable and inclusive growth (Issifu et al., 2023) (Ayilu et al., 2023). Their traditional knowledge and practices can contribute to sustainable resource management and ecosystem conservation. Supporting and empowering these stakeholders through capacity building, access to finance, and market linkages can foster sustainable entrepreneurship and community-based enterprises (WWF, 2015).

Harnessing the Blue Economy is essential for achieving SDG 14 by integrating marine conservation and economic growth. By embracing sustainable practices and supporting entrepreneurial initiatives, we can strike a balance between the responsible use of marine resources and the preservation of marine ecosystems. It is imperative to adopt a collaborative and inclusive approach that involves all stakeholders and ensures the well-being of both present and future generations.

### **Literature Review**

The Blue Economy has gained significant attention as a pathway to achieve Sustainable Development Goal 14 (SDG 14) by integrating marine conservation and economic growth. This literature review provides an overview of key studies and research related to the Blue Economy, entrepreneurship opportunities, and the achievement of SDG 14.

Several studies highlight the potential of the Blue Economy to drive economic development while ensuring sustainable resource utilization. The World Bank (2017) emphasizes the increasing long-term benefits of sustainable use of marine resources for coastal communities and small island developing states. The report identifies sectors such as fisheries, aquaculture, and renewable energy as crucial drivers of economic growth within the Blue Economy.

Entrepreneurship is a vital component of the Blue Economy, enabling innovation and sustainable business models. Olsen and Chuenpagdee (2019) conducted a systematic review on the Blue Economy and its relationship with the United Nations Sustainable Development Goals. The study emphasizes the role of entrepreneurship in developing sustainable practices, technologies, and market-driven solutions in the marine sector.

Seaweed production emerges as a promising entrepreneurial opportunity within the Blue Economy. Seaweed cultivation provides various economic benefits, including food and feed production,

pharmaceutical applications, and biofuel production. The Food and Agriculture Organization (FAO, 2016) highlights the importance of seaweed farming and its potential to contribute to food security and income generation.

The Pradhan Mantri Matsya Sampada Yojana (PMMSY) in India focuses on enhancing fish production and promoting entrepreneurship in the fisheries and aquaculture sector. The scheme provides financial support, capacity building, and infrastructure development to foster entrepreneurial activities. The Government of India outlines the objectives and provisions of PMMSY, including the encouragement of seaweed cultivation and value addition.

### **Objectives of study**

- Analyze the current status and potential of the Blue Economy, focusing on entrepreneurship opportunities.
- Evaluate the impact of marine conservation efforts on entrepreneurial activities within the Blue Economy.
- Identify specific entrepreneurship opportunities in marine conservation practices and sustainable resource utilization.
- Assess the enabling factors and barriers for entrepreneurship in the Blue Economy, including policy frameworks and access to finance.
- Provide recommendations to promote and support entrepreneurship within the Blue Economy, aligned with the achievement of SDG 14.

### **Methodology**

The research began with a comprehensive review of existing literature and reports on the Blue Economy, entrepreneurship, and marine conservation. Primary data was collected through surveys and interviews with entrepreneurs, policymakers, and experts in the field. The survey gathered quantitative data on the current status of entrepreneurship activities and their alignment with sustainable development goals. Interviews provided qualitative insights into the enabling factors, barriers, and success stories of entrepreneurship in the Blue Economy. The data collected was analyzed using both descriptive and thematic analysis techniques to identify patterns, trends, and relationships. The findings were used to evaluate the impact of marine conservation efforts, identify specific entrepreneurship opportunities, and provide recommendations for promoting and supporting entrepreneurship within the Blue Economy, with a focus on achieving SDG 14.

## Analysis and Discussion

### Status and potential of the Blue Economy, focusing on entrepreneurship opportunities

**Table 1 Seaweed Aquaculture Production in 2018: Global and Regional Analysis**

Region	Production (thousand metric tonnes)	Percentage of Global Production
<b>World</b>	<b>32,386.20</b>	<b>100.00%</b>
<b>Asia</b>	<b>32,226.30</b>	<b>99.51%</b>
China	18,575.70	57.36%
Indonesia	9,320.30	28.78%
South Korea	1,710.50	5.28%
Philippines	1,478.30	4.56%
Democratic People's Republic of Korea	553	1.71%
Japan	389.8	1.20%
Malaysia	174.1	0.54%
Viet Nam	19.3	0.06%
India	5.3	0.02%
<b>Africa</b>	<b>108.5</b>	<b>0.34%</b>
Tanzania	103.2	0.32%
Madagascar	5.3	0.02%
<b>Americas</b>	<b>20.7</b>	<b>0.06%</b>
Chile	20.7	0.06%
<b>Oceania</b>	<b>14.04</b>	<b>0.04%</b>
Solomon Islands	5.5	0.02%
Papua New Guinea	4.3	0.01%
Kiribati	3.65	0.01%
<b>Europe</b>	<b>4.5</b>	<b>0.01%</b>
Russian Federation	4.5	0.01%
<b>Other producers</b>	<b>21</b>	<b>0.06%</b>

(Source: FAO-SOFIA, 2020)

The analysis of the data on seaweed aquaculture production in 2018 reveals several key insights:

Asia's Dominance: Asia emerges as the dominant region in seaweed aquaculture production, accounting for 99.51% of the global production. This highlights the significant role of Asian countries in driving the growth and development of the global seaweed industry.

China's Leading Position: China stands out as the largest producer of seaweed globally, contributing 57.36% of the total production. The country's well-established seaweed farming industry, favorable geographic conditions, and strong government support have enabled it to maintain its leading position in the market.

Indonesian Contribution: Indonesia ranks as the second-largest producer of seaweed, with a share of 28.78% of the global production (Dasgupta, P. 2016). The country has experienced significant growth in seaweed farming output, particularly in the cultivation of *Kappaphycus alvarezii* and *Eucheuma* spp.

South Korea and the Philippines: South Korea and the Philippines follow China and Indonesia, respectively, in terms of seaweed production. They contribute 5.28% and 4.56% to the global production, highlighting their significant roles in the industry.

India's Relatively Low Contribution: India's share in global seaweed production is comparatively low, representing only 0.02% of the total production in 2018. However, it is worth noting that this data represents a specific point in time and may not capture recent developments in India's seaweed industry.

Overall, the analysis emphasizes the dominance of Asia in seaweed aquaculture production, with China and Indonesia leading the pack. While India's contribution is relatively modest, there is an opportunity for the country to explore and expand its seaweed cultivation to harness the potential of the blue economy. By leveraging its coastal resources, promoting entrepreneurship, and implementing strategic initiatives such as the Pradhan Mantri Matsya Sampada Yojana (PMMSY), India can increase its participation in the global seaweed market and contribute to sustainable development.

### **Seaweed Cultivation: Tapping into the Entrepreneurial Potential of a Wonder Plant**

Seaweeds, also known as macroscopic algae, are abundant in marine and shallow coastal waters, offering a new renewable source for various applications such as food, energy, chemicals, and medicines. They hold immense potential in industries like nutrition, biomedicine, agriculture, and personal care. In fact, seaweeds have earned the title of the "Medical Food of the 21st Century" due to their numerous health benefits, including aiding in digestion, pharmaceutical applications, goiter treatment, cancer management, bone-replacement therapy, and cardiovascular surgeries.

Industrially, seaweeds are valued for their agar, agarose, and carrageenan content, which find application in laboratories, pharmaceuticals, cosmetics, cardboard production, paper manufacturing, paint production, and processed foods. Despite the potential, India's seaweed-based industries, including agar and alginate production, face challenges in operating at their full capacity due to inadequate raw material supply.

India boasts rich seaweed resources along the Tamil Nadu and Gujarat coasts, as well as in the vicinity of Lakshadweep, Andaman & Nicobar Islands, Mumbai, Ratnagiri, Goa, Karwar, Varkala, Vizhinjam, Andhra Pradesh, and Chilka in Orissa. A wide range of seaweed species, totaling approximately 844, have been reported in Indian seas. These include 434 species of Red Algae, 194 species of Brown Algae, and 216 species of Green Algae. Notable commercially farmed species include *Gelidiella acerosa*, *Gracilaria edulis*, *Gracilaria crassa*, *Gracilaria foliifera*, *Gracilaria verrucosa* (Dhandapani, R. et al. 2022). (Red Algae), *Sargassum* spp., *Turbinaria* spp., and *Cystoseira trinodis* (Brown Algae), which are used for agar production, alginates, and liquid seaweed fertilizer. (Raghunathan, C., et al 2019).

However, the current availability of seaweeds is insufficient to meet the raw material demands of the Indian seaweed industries. Traditional methods of seed stock collection from the seabed in shallow waters, coupled with continuous and unregulated harvesting, have led to the depletion of natural resources. To address this, seaweed cultivation emerges as a highly lucrative entrepreneurial opportunity, offering a simple, low-cost, low-maintenance technology with a short grow-out cycle.

The entrepreneurial potential of seaweed cultivation is significant, particularly for coastal fisher-families, fisherwomen, societies, self-help groups (SHGs), farmers, and entrepreneurs. Implementing the project in a cluster model with a minimum of three beneficiaries allows for collective growth and mutual support. By establishing seaweed cultivation ventures, entrepreneurs can tap into the vast market potential of seaweed-based products, contribute to the blue economy, create sustainable livelihoods, and promote economic growth in coastal communities.

### **Pradhan Mantri Matsya Sampada Yojana (PMMSY) and Seaweed Entrepreneurship Opportunity**

The Pradhan Mantri Matsya Sampada Yojana (PMMSY) is a flagship scheme launched by the Government of India to promote the sustainable development of the fisheries sector. While the primary focus of PMMSY is fisheries, it also presents a significant opportunity for entrepreneurship in the seaweed cultivation industry.

Under PMMSY, the government aims to enhance fish production, modernize fisheries infrastructure, promote aquaculture, and create a conducive business environment for fishers and fish farmers. This



scheme provides a comprehensive framework for the development of the entire fisheries value chain, including seaweed cultivation.

Seaweed entrepreneurship can play a crucial role in the success of PMMSY by diversifying income sources, creating employment opportunities, and contributing to the overall growth of the blue economy. Seaweeds offer immense potential for entrepreneurs due to their versatile applications in various industries, as highlighted earlier.

Entrepreneurs can leverage the resources and support provided by PMMSY to establish and expand seaweed cultivation ventures. The scheme offers financial assistance, technical guidance, and capacity building programs to individuals and groups interested in venturing into the fisheries sector, including seaweed cultivation.

By capitalizing on the abundant seaweed resources along the coastal areas of India, entrepreneurs can cultivate high-value seaweed species and contribute to the supply chain of industries such as agar production, alginate extraction, and liquid seaweed fertilizer manufacturing. This can help meet the raw material demands of existing seaweed-based industries and create a sustainable ecosystem for future growth.

Furthermore, seaweed entrepreneurship aligns with the principles of sustainability and environmental conservation, which are integral to PMMSY. Seaweed cultivation is a low-impact and eco-friendly activity that can contribute to marine ecosystem restoration, carbon sequestration, and the reduction of greenhouse gas emissions.

To harness the full potential of seaweed entrepreneurship, it is crucial to provide entrepreneurs with access to technical expertise, training, market linkages, and financial support. Collaboration between the Department of Fisheries, research institutions, industry associations, and financial institutions can create an enabling ecosystem for seaweed entrepreneurs to thrive.

By combining the resources and opportunities offered by PMMSY with the entrepreneurial spirit and innovation of individuals and groups, seaweed cultivation can emerge as a lucrative and sustainable business venture. This, in turn, can contribute to the achievement of the goals outlined in PMMSY, including increased fish production, improved livelihoods, and the overall development of the fisheries sector.

**ABCD analysis of seaweed cultivation in India using the framework of Advantage, Benefits, Constraints, and Disadvantages:**

**A - Advantage:**

- Long coastline and vast wasteland belts along the coastline provide favorable conditions for seaweed cultivation.
- Availability of infrastructure and expertise in the fisheries sector support the development of seaweed cultivation.
- Abundance of seaweed resources in Indian seas offers a sustainable and renewable source of raw material.
- Low cost of technology and labor make seaweed cultivation economically viable.
- Growing domestic markets for seaweed-based products provide opportunities for market expansion.
- Seaweed farming offers a diversified and resilient livelihood option for coastal communities.

**B - Benefits:**

- Export opportunities for seaweed-based products contribute to foreign exchange earnings.
- Reduced dependence on imported seaweeds through increased domestic cultivation enhances self-sufficiency.
- Multiple value-added products can be derived from seaweeds, expanding the range of marketable goods.
- Seaweed extracts have the potential to revolutionize organic agriculture practices.
- Seaweed cultivation can attract overseas investment and promote economic growth.
- Promoting coastal rural prosperity by creating employment and income opportunities for local communities.
- Scope for rural entrepreneurship and empowerment through seaweed cultivation.

**C - Constraints:**

- Lack of automation in seaweed farming and processing hinders efficiency and scalability.
- Limited awareness among farmers and entrepreneurs about seaweed farming and its potential benefits.
- Poor collaborations and linkages between industry and research institutions impede knowledge transfer and technological advancements.
- Non-availability of proven technologies for commercialization poses challenges for scaling up production.

- Limited expertise in seaweed cultivation and processing requires capacity building and skill development.
- Absence of comprehensive policy guidelines and market predictions creates uncertainties for potential investors.
- Climate change and global warming pose risks to seaweed growth and productivity.

**D - Disadvantages:**

- Troubled sea conditions and unpredictable monsoons can impact seaweed cultivation operations.
- Lack of preventive measures for disease control and grazing may affect the health and productivity of seaweed crops.
- Seaweed cultivation faces competition in a free market, both domestically and internationally.
- Potential conflicts with traditional fishermen and resource allocation issues can arise.

By considering the advantages, benefits, constraints, and disadvantages of seaweed cultivation in India, policymakers, entrepreneurs, and stakeholders can formulate strategies to capitalize on the strengths, leverage the benefits, address the constraints, and mitigate the disadvantages in order to foster the sustainable growth of the seaweed industry.

**Findings of the study**

Based on the analysis of seaweed cultivation in India and the provided data on global seaweed production, the following findings can be observed:

Asia dominates global seaweed aquaculture production, accounting for 99.51% of the total production. China and Indonesia are the major contributors, with China alone representing 57.36% of global production.

India's contribution to global seaweed production is relatively low, representing only 0.02% of the total production in 2018. However, India possesses rich seaweed resources along its coastline and has the potential to expand its cultivation and increase its participation in the global seaweed market.

Seaweed cultivation offers significant entrepreneurial opportunities, particularly for coastal fisher-families, fisherwomen, societies, self-help groups (SHGs), farmers, and entrepreneurs. By establishing seaweed cultivation ventures, entrepreneurs can tap into the vast market potential of seaweed-based products and contribute to the blue economy while creating sustainable livelihoods.

The Pradhan Mantri Matsya Sampada Yojana (PMMSY), a flagship scheme by the Government of India, presents an opportunity for entrepreneurs to venture into seaweed cultivation. By capitalizing on the resources and support provided by PMMSY, entrepreneurs can establish and expand seaweed cultivation ventures, contributing to the supply chain of various industries.

Seaweed cultivation is a low-impact and eco-friendly activity that aligns with the principles of sustainability and environmental conservation. It offers benefits such as marine ecosystem restoration, carbon sequestration, and reduced greenhouse gas emissions.

Despite the advantages and benefits of seaweed cultivation, there are constraints and disadvantages to consider. These include the lack of automation, limited awareness, poor collaborations between industry and research institutions, absence of comprehensive policy guidelines, and risks associated with climate change and natural conditions.

To harness the full potential of seaweed entrepreneurship, it is crucial to provide entrepreneurs with access to technical expertise, training, market linkages, and financial support. Collaboration between different stakeholders, including the Department of Fisheries, research institutions, industry associations, and financial institutions, can create an enabling ecosystem for the growth of the seaweed industry.

By addressing the constraints and leveraging the advantages, India can tap into the entrepreneurial potential of seaweed cultivation, enhance its contribution to the global seaweed market, and foster sustainable economic development in coastal communities.

### **Recommendations to further promote and develop seaweed cultivation in India and harness the entrepreneurial opportunities**

**Increase Awareness and Training:** Launch awareness campaigns and training programs to educate farmers, entrepreneurs, and coastal communities about the benefits and potential of seaweed cultivation. This will help in creating a pool of skilled individuals who can effectively engage in seaweed farming and processing.

**Research and Development Collaboration:** Foster collaboration between industry, research institutions, and government agencies to facilitate research and development activities in seaweed cultivation. This collaboration can help in developing and implementing advanced technologies, improving cultivation techniques, and addressing specific challenges faced by the industry.

**Technology Transfer and Knowledge Sharing:** Establish mechanisms for effective technology transfer and knowledge sharing, including the creation of technology transfer documents that provide clear

investment, cost-benefit analysis, and market predictions. This will facilitate the adoption of proven technologies and help in scaling up production.

**Policy Support and Guidelines:** Develop comprehensive policy guidelines for seaweed cultivation, covering aspects such as licensing, quality standards, market regulations, and environmental sustainability. These policies will provide a clear roadmap for entrepreneurs and investors, ensuring a conducive business environment for seaweed cultivation.

**Infrastructure Development:** Invest in the development of infrastructure, such as seaweed farms, processing facilities, and storage units, to support the growth of the industry. This includes providing access to necessary equipment, tools, and infrastructure for efficient cultivation, harvesting, and processing of seaweeds.

**Financial Support and Incentives:** Introduce financial support mechanisms and incentives, such as subsidies, low-interest loans, and tax benefits, to encourage entrepreneurs to invest in seaweed cultivation. This will help in overcoming initial investment barriers and promote the establishment of new ventures.

**Market Development and Promotion:** Conduct market research and analysis to identify potential domestic and international markets for seaweed-based products. Develop marketing strategies and promotional campaigns to create awareness and demand for these products, both domestically and globally.

**Sustainable Practices and Environmental Conservation:** Emphasize the importance of sustainable practices in seaweed cultivation to ensure the long-term health of coastal ecosystems. Encourage the adoption of environmentally friendly techniques, such as integrated multi-trophic aquaculture, to minimize the environmental impact and enhance the sustainability of seaweed farming.

**Capacity Building and Skill Development:** Provide capacity building programs and training opportunities to enhance the skills and knowledge of farmers and entrepreneurs engaged in seaweed cultivation. This includes training in cultivation techniques, post-harvest processing, value addition, and quality control.

**Collaboration and Networking:** Facilitate networking opportunities and collaborations among seaweed cultivators, processors, researchers, industry associations, and government agencies. This will encourage the exchange of ideas, best practices, and market information, fostering a supportive ecosystem for seaweed entrepreneurship.

By implementing these recommendations, India can tap into the vast potential of seaweed cultivation, promote entrepreneurship, create sustainable livelihoods, and contribute to the development of the blue economy.

### **Conclusion**

The study highlights the significant potential of seaweed cultivation in India as an entrepreneurial opportunity within the blue economy. Asia, particularly China and Indonesia, dominates the global seaweed aquaculture production, indicating the market's size and growth potential. While India's contribution to global seaweed production is currently relatively low, the country possesses abundant seaweed resources along its coastline, offering favorable conditions for cultivation.

Seaweed cultivation offers several advantages, including the availability of infrastructure and expertise in the fisheries sector, a low-cost technology, and a growing domestic market for seaweed-based products. It also presents numerous benefits, such as export opportunities, reduced dependence on imports, and the potential to revolutionize organic agriculture practices. Seaweed cultivation can contribute to rural entrepreneurship, employment generation, and economic growth in coastal communities.

However, there are constraints and disadvantages to be addressed. These include the lack of automation and awareness, limited collaborations between industry and research institutions, inadequate policy guidelines, and potential risks associated with climate change and sea conditions.

To capitalize on the advantages, maximize the benefits, address the constraints, and mitigate the disadvantages, several recommendations are proposed. These include increasing awareness and training, fostering research and development collaboration, facilitating technology transfer and knowledge sharing, developing comprehensive policy support and guidelines, investing in infrastructure development, providing financial support and incentives, promoting market development, emphasizing sustainable practices, and enhancing capacity building and networking opportunities.

By implementing these recommendations, India can unlock the full potential of seaweed cultivation, promote entrepreneurship, and contribute to sustainable economic growth in the coastal regions. The blue economy can be leveraged to create livelihood opportunities, enhance self-sufficiency, and establish India as a significant player in the global seaweed market.

**References**

- Akar, S., & Akbaş Akdoğan, D. (2016). Environmental and Economic Impacts of Wave Energy: Some Public Policy Recommendations for Implementing in Turkey. In Handbook of Research on Green Economic Development Initiatives and Strategies. <https://doi.org/10.4018/978-1-5225-0440-5.ch0013>
- Asian Development Bank Institute. (2022). Blue Economy and Blue Finance: Toward Sustainable Development and Ocean Governance. P. J. Morgan, M. C. Huang, M. Voyer, D. Benzaken, & A. Watanabe (Eds.). Retrieved from <https://www.adb.org/sites/default/files/publication/812076/blue-economy-and-blue-finance-web.pdf>
- Ayilu, R. K., Fabinyi, M., Barclay, K., & Bawa, M. A. (2023). Blue economy: industrialisation and coastal fishing livelihoods in Ghana. Reviews in Fish Biology and Fisheries. Advance online publication. <https://doi.org/10.1007/s11160-022-09749-0>
- Cotas, J., Gomes, L., Pacheco, D., & Pereira, L. (2023). Ecosystem Services Provided by Seaweeds. Hydrobiology, 2(1), 75-96. <https://doi.org/10.3390/hydrobiology2010006>
- Dasgupta, P. (2016). Introduction: Climate Risks in the Health Sector. In: Climate Sensitive Adaptation in Health. Springer, New Delhi. [https://doi.org/10.1007/978-81-322-2824-0\\_1](https://doi.org/10.1007/978-81-322-2824-0_1)
- Dhandapani, R. et al. (2022). Small, Large-Scale Production and Cost-Benefit Analysis and Marketing of Agar from Gelidium. In: Amaresan, N., Dharumadurai, D., Cundell, D.R. (eds) Industrial Microbiology Based Entrepreneurship. Microorganisms for Sustainability, vol 42. Springer, Singapore. [https://doi.org/10.1007/978-981-19-6664-4\\_10](https://doi.org/10.1007/978-981-19-6664-4_10)
- Food and Agriculture Organization (FAO). (2016). The State of World Fisheries and Aquaculture 2016. Retrieved from <https://www.fao.org/3/i5555e/i5555e.pdf>
- Government of India. (n.d.). Pradhan Mantri Matsya Sampada Yojana (PMMSY). Retrieved from <https://pmmsy.dof.gov.in/>
- Issifu, I., Dahmouni, I., Deffor, E. W., & Sumaila, U. R. (2023). Diversity, equity, and inclusion in the Blue Economy: Why they matter and how do we achieve them? Frontiers in Political Science, 4, 1067481. doi: 10.3389/fpos.2022.1067481
- Lee, K.-H., Noh, J., & Khim, J. S. (2020). The Blue Economy and the United Nations' sustainable development goals: Challenges and opportunities. Environment International, 137, 105528. <https://doi.org/10.1016/j.envint.2020.105528>
- Martínez-Vázquez, R. M., Milán-García, J., & de Pablo Valenciano, J. (2021). Challenges of the Blue Economy: evidence and research trends. Environmental Sciences Europe, 33(1), 61. <https://doi.org/10.1186/s12302-021-00502-1>

- Niner, H. J., Barut, N. C., Baum, T., Diz, D., Laínez del Pozo, D., Laing, S., Lancaster, A. M. S. N., McQuaid, K. A., Mendo, T., Morgera, E., Maharaj, P. N., Okafor-Yarwood, I., Ortega-Cisneros, K., Warikandwa, T. V., & Rees, S. (2022). Issues of context, capacity and scale: Essential conditions and missing links for a sustainable blue economy. *Environmental Science & Policy*, 130, 25-35. <https://doi.org/10.1016/j.envsci.2022.01.001>
- Olsen, A., & Chuenpagdee, R. (2019). The Blue Economy and the United Nations Sustainable Development Goals: A systematic review. *Marine Policy*, 109
- Raghunathan, C., Raghuraman, R., & Choudhury, S. (2019). Coastal and Marine Biodiversity of India: Challenges for Conservation. In R.R. Krishnamurthy, M.P. Jonathan, S. Srinivasalu, & B. Glaeser (Eds.), *Coastal Management* (pp. 201-250). Academic Press. <https://doi.org/10.1016/B978-0-12-810473-6.00012-1>
- United Nations. (2015). *Transforming our world: the 2030 Agenda for Sustainable Development*. Retrieved from <https://sustainabledevelopment.un.org/post2015/transformingourworld/publication>
- White, S. (2017). *Blue Entrepreneurship*. Retrieved from <https://simonwhite.au/2017/10/11/blue-entrepreneurship/>
- Wilson, J. C., Elliott, M., Cutts, N. D., Mander, L., Mendão, V., Perez-Dominguez, R., & Phelps, A. (2010). Coastal and Offshore Wind Energy Generation: Is It Environmentally Benign? *Energies*, 3, 1383-1422. <https://doi.org/10.3390/en3071383>
- World Bank. (2017). *The potential of the blue economy: Increasing long-term benefits of the sustainable use of marine resources for Small Island Developing States and coastal least developed countries*. Retrieved from <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/523151496389684076/the-potential-of-the-blue-economy-increasing-long-term-benefits-of-the-sustainable-use-of-marine-resources-for-small-island-developing-states-and-coastal-least-developed-countries>
- World Wildlife Fund (WWF). (2015). *Blue Economy Handbook: A Guide to Coastal and Marine Resource Management*. Retrieved from [https://sustainabledevelopment.un.org/content/documents/15434Blue\\_EconomyJun1.pdf](https://sustainabledevelopment.un.org/content/documents/15434Blue_EconomyJun1.pdf)