



The Rationale, Status Quo and Suggestions for the Caribbean Blue Economy

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Abstract. The blue economy is a marine economy infused with the concept of sustainable development. It aims to promote economic growth, improve people's lives and protect the marine ecological environment through the sustainable development and utilization of marine resources. The blue economy has become the mainstream paradigm leading the development of the global marine economy. Caribbean countries also suit to the blue economy. However, Caribbean countries are facing multiple challenges that may constrain development potentials, such as the current degradation of resources and ecosystem, limited internal and external financial support, and weak research capacity. To resolve these challenges, Caribbean countries should establish an integrated ocean governance framework, attract investment for the blue economy and encourage more education and research opportunities. In the current era, the blue economy will surely become the way for Caribbean countries to achieve greater development and will occupy an increasingly important position in the regional governance system.

Keywords: Blue Economy · Caribbean Region · Ocean

1 Introduction

1.1 Background

The ocean covers 71% of the earth's surface and influences almost 40% of the world's population living near the coast, which significantly contributes to economic growth and social welfare. Global ocean-based industries have generated over \$5 trillion, offered 35 million working opportunities, and provided abundant resources such as food and mineral. Under the context of a rapidly growing population, large demand for food and energy, progress in technology, and changing patterns in utilization of the ocean, it is estimated that the impact of the ocean will increase in the future.

However, small islands and developing countries in the Caribbean region cannot fully enjoy the advantages of the ocean. Because they are constrained by inherent weaknesses such as the low adaptive capacity to climate change, lack of resilience from disaster, diminishing natural resources, and limited access to financial support. To better strengthen the development of Caribbean states and achieve the United Nations Sustainable Goals (SDGs), they call for the blue economy that aims to achieve: sustainable

and inclusive economic and social growth; reduction in the overuse of marine resources, and destruction of the marine ecosystem; improvement on the capacity of dealing with natural disasters and climate change.

1.2 Related Research

BU emphasized that the Caribbean countries must develop a blue economy. The author mentioned three reasons. First, the blue economy promoted sustainable economic development in Caribbean countries. Second, it helped Caribbean countries reduce their overdependence on fossil fuels and establish a more sustainable energy consumption structure. Third, it was a useful and efficient way to protect the environment and deal with climate change problems [1]. Lin analyzed many kinds of marine economic initiatives, laws, and strategies which were published by states and international organizations. Most of them considered the blue economy as an important pathway to combine conservation and growth in the context of oceans. For example, the United Nations proposed 17 SDGs in 2015, calling for the blue economy to promote sustainable use of the oceans and marine resources for sustainable development [2].

Rustomjee showed how ‘the blue economy approach offers innumerable practical opportunities for small states’. The author mentioned several points. First, small states’ tourism products could be diversified and increased by the blue growth approach. Besides, ocean clean energy provided an opportunity for small states to transform from reliance on imported energy and ensure long-term energy security. What’s more, the blue economy was beneficial to the fisheries sector, which helps to increase food security, export, and employment [3]. Hampton and Jeyacheya stated that unsustainable island tourism may hurt the blue economy’s development. For most Caribbean states, tourism was a dominant source of GDP. However, it also put enormous pressure on the state’s environment and natural resources, because tourism increased the demand for fresh water, electricity, fossil fuels, etc. [4]. The Caribbean Development Bank (CDB) pointed out that the blue economy strategy in Caribbean countries faced challenges in 4 areas: institutions, resources, output, and integration. For institutions, the challenge was capturing sectors such as tourism, trade and fishing, and related economic activities into a single policy framework. For resources, the blue economy required significant investments, but it is difficult to get enough financial support in the context of low growth and high debt [5].

Clegg et.al also identified a key challenge. To take advantage of the economic development, environmental protection, and local heritage conservation opportunities presented by the blue economy, the Caribbean region needed effective coastal and marine spatial planning. However, under a complicated geopolitical environment, it would be a challenge to establish such a jurisdiction [6]. Mcconney and Compton emphasized that national ocean governance was the foundation for blue economic development. However, many Caribbean states’ governments lacked the capacity and experience to formulate an effective policy for a comprehensive and coherent transition to the blue economy. Therefore, to meet the demands for transition, several proposals were included: establish a national inter-sectoral coordination mechanism; appreciate the value of marine resources and ecosystem; establish and institutionalize an information and knowledge exchanging mechanism [6]. Haraksingh proposed several policy suggestions for Caribbean countries

to achieve the target of 28% renewable energy contribution to electricity production in 2022. To achieve the target, Caribbean states should develop marine renewable energy (MRE), such as wind and solar energy. Besides, governments should treat MRE as the core aspect of the blue economy. What's more, aiming at unique states, governments, and related institutions needed research to ensure the best policies are developed [6]. Patil et.al pointed out an approach for the transition to a Caribbean blue economy. The author designed a set of 'Ocean Principles' for the region's blue economy that could help to guide both investment and policy. The investment part included 10 principles, for example, sustainable development which focused on the use of resources to optimize the well-being of people. The policy framework designed policies of integrated ocean governance and policy objectives for a healthy, sustainable, and fertile marine environment [7].

1.3 Objective

Most Caribbean countries are developing island countries and facing a series of opportunities and challenges related to the ocean. This article will analyze the reasons for Caribbean countries to develop the blue economy, the status quo, and challenges, and offer corresponding suggestions.

2 The Rationale and Status Quo

2.1 Promoting Caribbean Economic Growth

The ocean economy contributes a lot to the Caribbean region's economy. The value of the output of the Caribbean ocean economy reached \$407 billion, which generated 14% to 27% of the global ocean economy and 18% of the region's GDP [1]. Jamaica's tourism minister, Edmund Bartlett, said that "more than 80 percent of Jamaica's GDP is generated in coastal areas" [8].

The tourism sector is the pillar industry in most of the Caribbean states. It attracts over 22 million people per year to enjoy the beach and sunshine, and these people spent \$13 billion in 2014, which equals approximately 11% of the regional GDP. The sector also creates many employment opportunities. It is estimated that over one-third labor force engages in tourism in the more tourism-dependent countries [5]. The blue economic approaches can help to reform the sector by establishing a political and economic framework for sustainable tourism; attracting foreign investment for sustainable tourism infrastructure, workforce training and advertising; diversifying, and creating Caribbean tourism products.

The fisheries sector also plays an important role in Caribbean economic growth. First, fisheries production, which reaches 371,652 metric tons [9], provides 16.5% of animal protein consumption in the region [1]. According to the United Nations, the consumption of fish in some Caribbean countries can be 4 times more than the global average per capita. Besides, the fisheries sector provided working opportunities for 350,000 labor force in the region and generated an output value of over \$500 million [10]. In Guyana, the fisheries sector created 3000 jobs and provided value for \$40 million in 2019 [11].

Table 1. Fisheries contribution to GDP

	2004	2008	2012	2016
Anguilla	2.37	2.03	2.81	3.11
Dominica	0.37	0.44	0.36	0.69
Grenada	1.43	1.44	1.49	1.64
Montserrat	0.25	0.22	0.25	0.18
Saint Lucia	0.67	0.69	0.70	0.63
St. Vincent/Grenadines	0.47	0.37	0.37	0.37

If blue economy approaches are used, advantages include: expanding the output value of the fisheries sector and employing more labor force; enacting a policy to mitigate the problem of overfishing; improving the stability and sustainability of coastal communities that rely on fisheries for food and livelihood (Table 1).

2.2 Protecting Caribbean Environment

The Caribbean region is extremely rich in marine ecological resources. Although the Caribbean Sea only accounts for 1% of the global ocean area, it has nearly 10% of the world's coral reefs, 1,400 species of fish and marine mammals, and abundant coastal vegetation such as mangroves [1]. The marine ecosystem can regulate atmospheric gases and climate change because its mangroves can store and absorb heat and carbon dioxide [3]. Also, it plays a unique role in disaster prevention and mitigation in Caribbean countries. For example, a strong hurricane always causes twice the damage to a small island nation's GDP in a matter of hours [1]. But in Guyana, coral reefs help to reduce wave energy up to 97%, and reefs reduce the annual expected damages from storms by more than \$4 billion [11].

However, the degradation of the Caribbean marine ecosystem has begun to increase in recent years. Excessive human activities are the main reason. According to the World Bank, 75% of the coral reefs in the region are at risk due to human activities such as coastal development. 55% of fishery resources in the region face the risk of overfishing because 20% to 30% of fishing activities are illegal [12]. What's more, 85% percent of untreated wastewater and over 0.16 million metric tons of plastic were discharged into the Caribbean Sea [8]. The toxic pollution can cause the death of marine life and finally threaten the health and safety of the human being [5].

The blue economy makes efforts to protect the ocean from further degradation and make strategies that are regenerative and resilient [5]. The efforts include the conservation of biodiversity with initiatives such as restoration of mangrove forests, seagrass beds, and coral reefs, and the establishment of fish sanctuaries for the resilience of sensitive fisheries. Also, there will be strong regulatory frameworks and guidelines for coastal development and restoration [8].

2.3 Improving Caribbean Social Welfare

Even though the Caribbean countries made several significant development outcomes during these years, it still faces serious human development problems [11], such as high unemployment (9.8%), very high youth unemployment (46%), high citizen insecurity, and crime (32 per 100,000 people) [9]. These problems reflect “a challenge of social exclusion—a multidimensional phenomenon where certain populations aren’t able to equally participate in and benefit from society” [5]. Such exclusion also exists in the marine economy, where certain groups, especially women, face barriers to accessing quality education, training opportunities, financial support, and other resources.

Blue economy seeks to empower and promote the traditionally marginalized and underrepresented groups (like youth and women) in social, economic, and political activity [5]. Its supports include good quality education for all and provide workforce skills training based on employers’ needs. Also, it advocates conditional cash transfers to the most vulnerable people [11]. What’s more, it helps to create a sound policy framework based on pro-poor and gender-sensitive development strategies [7].

3 Challenges

3.1 Ocean Degradation

The foundations for developing the Caribbean blue economy are the abundant natural resources and healthy ecosystem, which can be seen as natural capital from an economic perspective. Natural capital mainly includes: marine animals and marine plants that can be cultivated or fished for consuming and selling; an ecosystem that reflects the interaction between organisms and the nonliving environment as a functioning unit (sea grass ecosystems, mangrove forests, etc.) [7]. However, the Caribbean ocean, the home, and basis of natural capital, is facing serious problems of degradation.

Fishery resources are vulnerable today. In the Caribbean Sea, over 60% of marine commercial species are facing the problem of overfishing or even collapse [7]. According to International Union for Conservation of Nature (IUCN), 2800 marine species live from Papua New Guinea to the Cook Islands, but 11% of them in the region are threatened with extinction, including fish that are important food sources [13]. Besides, million tons of plastic pollution enter the ocean [7], which put significant stress on the habitats of some commercially important species [6].

b) Coastal development has both advantages and disadvantages. On the one hand, approaches like filling wetlands and hardening coastlines create space for construction [7]. For example, Grenada proposed Blue Growth Coastal Master Plan in 2016, which focused on the investment around its coastline. The investment ranges from hotels, marinas, sports villages, and convention centers [14]. On the other hand, dredging, sand mining, and mangrove removal have largely deteriorated the ecosystem, since 38% of coral reefs and 20% of mangrove forests have disappeared in 10 years [3].

c) Climate change, directly and indirectly, impact the natural capital of the Caribbean Sea. “The effect of climate change will be most critical for the major coastal ecosystems (coral reefs, seagrasses, and mangroves) as well as their associated organisms (fish and shellfish)” [6]. For example, the rise of sea surface temperature is considered as the

immediate cause that led to coral bleaching in the Caribbean [15]. What's more, climate change and anthropogenic nutrient enrichment caused sargassum inundation, which made devastating consequences for natural capital such as fish, seagrass, and mangroves [6].

3.2 Limited Financial Support

For Caribbean states to effectively and sustainably develop the blue economy, sectors like tourism and fisheries, and many vital issues such as promotion of food security, management of coastal development, and dealing with climate change need significant financial support. However, supports like investments, aid, and concessional loans in the Caribbean region are limited by several challenges.

The scale of investment is largely influenced by the macro environment. Today, the Caribbean states are facing a serious domestic and external environment due to the COVID-19 pandemic. An increasing number of new infections, the failure of small-sized companies, rising unemployment, and the poverty population have forced the governments to invest more resources in controlling the spread of the pandemic. But for sure, the investment allocated to the blue economy will decline. In addition, external challenges such as a significant blow to the Caribbean's pillar sector (tourism), disruption in global supply chains, and risk aversion awareness for foreign investors contract the foreign direct investment [16].

In the Caribbean region, high debt levels and interest payments have decelerated economic growth and social development, while limiting new investments at the same time. In the past two decades, the region's public debt has been on an upward trend, which reached \$57 billion in 2017 [5]. According to Economic Commission for Latin America and the Caribbean (ECLAC)'s executive secretary Alicia Bárcena, "Caribbean economies have the highest debt ratios in the world, averaging 68.5% of GDP in 2019" [16]. Such debt is rooted in a less favorable external context, inherently social and economic weaknesses (less fiscal space, inflationary pressures, exchange rate volatility), compounded by the impact of natural disasters (Table 2).

Another key challenge for Caribbean states is their eligibility for financial aids and concessional loans from developed states and international organizations. Such aids and loans always use GDP per capita as the indicator to decide the eligibility and resource allocation. However, many Caribbean states are at a middle or high GDP per capita status. For example, within all the 187 states, the Bahamas ranks NO. 35 and Barbados ranks NO. 53 [17]. By calculating the United Nation's Human Development Index, Panama and The Bahamas reached a value of 0.815 and 0.814 respectively, which are classified as "very high" [18]. Although few Caribbean states have access to the World Bank's concessional International Development Association (IDA) window under its "small island exception", this does not extend to all Caribbean countries. The development finance to the Caribbean has been described as a declining trend, falling from 0.72% of global ODA in 2000 to 0.52 in 2016. Also, from the perspective of the Caribbean Development Bank, it has a policy that ensures states get concessional resources to deal with regional development problems. But states that have high GDP per capita "do not receive a specific country allocation and can only benefit from projects with regional scope, or in the case of emergency assistance" [5] (Fig. 1).

Table 2. Debt-to-GDP ratios (%)

	2016	2017
Montserrat	5.1	6.1
British Virgin Islands	18.8	18.7
Haiti	33.7	32.6
Anguilla	60.6	50.8
Suriname	68.8	63.2
Dominica	72.7	69.4
Antigua and Barbuda	81.9	78.3
Jamaica	119.4	111.9
Barbuda	161.5	157.1

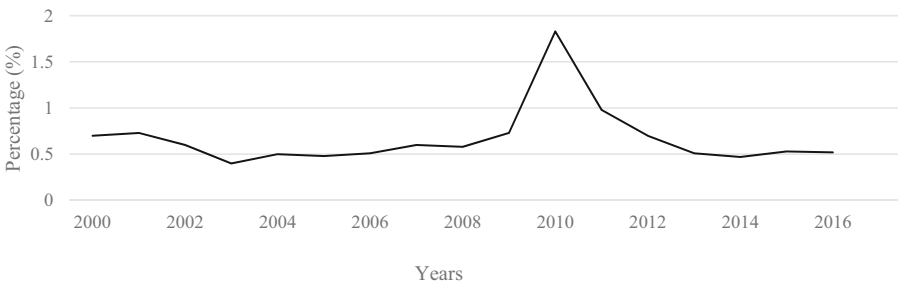


Fig. 1. Share of global official development aid to Caribbean countries (photo credit: original)

3.3 Insufficient Research Capacity

Although Caribbean countries have recognized the importance of developing “Coastal and Marine Spatial Planning”, the lack of research capacity constitutes the biggest constraint. Only a few countries have established specialized research institutions like Grenada. Most countries have not formulated a comprehensive research strategy, and the research on the oceans is still relatively lacking, which is not enough to translate into effective decision-making by the government.

In addition, except for the lack of financial support, the lack of technology and data is also an important reason for the low level of research in various countries. For example, Caribbean countries often lag behind or have no information on fish stocks, weather, ocean health, commodity pricing, supply and demand information, etc. [1]. Recently, some international cooperation that includes promoting knowledge and data sharing aims to solve the challenges. But such support brings new challenges like how to manage and interpret data [3].

What’s more, education and training are chronically outdated and unable to keep up. The supply of talent to countries and job markets also contributes to long-term insufficient capacity across countries.

4 Solutions

4.1 Integrated Ocean Governance

Establishing and implementing professional and coordinated policies and mechanisms in fields like economic growth, climate change, and marine conservation are necessary for resolving the ocean degradation challenges. However, current approaches mainly focus on traditional sector-specific management and the final goal of ocean governance remains detached [5]. Therefore, a regional integrated ocean governance framework is required to solve the problems.

An effective regional integrated ocean governance framework should include several factors. First, an integrated administrative structure is necessary. It should contain/establish formal and dedicated agencies to deal with ocean management issues, and it should also encourage informal actors (like NGOs, associations that reflect the interest of sectors and citizens, universities, and research institutions) to participate in the process. Besides, these departments need to frequently provide policy instruments, such as regulations or laws that offer all the states an ordered and fair developing environment, developing suggestions that better allocate and use marine resources while protecting the ocean at the same time. What's more, ensuring policies will be followed by Caribbean countries is necessary. To this end, the administrations have to promote the capacity for sharing data, identifying harmful actions, and evaluating policy utilities.

4.2 Investing in the Blue Economy

Promoting the blue economy requires a large investment to meet the demand for education, infrastructure, governance, research, and capacity-building. However, current financial support is inadequate for Caribbean countries, and they have to find new approaches to invest in the blue economy.

4.2.1 Blended Finance

Blended finance is defined as “the strategic use of development finance and philanthropic funds to mobilize private capital flows to emerging and frontier markets”. It aims to support the achievement of SDGs, especially in developing countries that always have a funding gap [19]. Under the context of the blue economy, blended finance can be used for the development of higher economic productivity, sustainable economic growth (SDG 8), sustainable fisheries sectors, long-term ocean conservation (SDG 14), and climate change actions (SDG 13), etc.

The concessional finance element in blended finance provides plenty of opportunities to develop the blue economy. Technical assistance is helpful for project preparation, and it underwrites both public and public investor risks by providing suggestions and decreasing transaction costs. Market incentives have encouraged blue economy entrepreneurship because the sound policies stimulate innovation in new markets and provide enterprises with strong confidence to get future payments [5]. Developing financial institutions allow the private sector to participate in the financing process and make investments more effective.

4.2.2 Debt-For-Nature Swaps

Debt-for-nature swaps are a kind of financial transaction that the creditor forgives a portion of the debt of a debtor nation in exchange for environmental protection investments from that country [5]. Generally, the creditor will sell all or part of the debt to a third party (always an environmental organization) at a price lower than the face value.

Debt-for-nature swaps are extremely suitable for Caribbean countries for it can make a win-win situation. On the one hand, it can reduce the debt pressure for most of the highly indebted Caribbean countries by lowering the debt servicing costs. On the other hand, adequate fund ensures the eagerness for marine conservation become viable. In addition, the debt is repaid by using the state's local currency (in the form of investment in protection activities). Compared with paying the debt in foreign currency, Debt-for-nature swaps will cause a more direct and positive economic impact on local society.

4.3 Improve Education and Research Capacity

“The contingent of vibrant, competent and professional youth are called for a new era” [20]. As a growing multi-trillion dollar sector, the blue economy needs new and diverse talent. However, many Caribbean students have not realized the importance of the blue economy, and they are leaving their school and searching for work [21]. Therefore, there should be a more intentional focus on aligning related education to Caribbean people.

To do so, some specific actions can be considered by governments. First, increasing education investment for universities to build relevant majors and research industry, encouraging educational institutions fully participate in research. Besides, providing more support and opportunities for adults to access equipment, and technical and skill training, such as how to use radar and sonar for effective fishing. In addition, establishing long-term cooperation with local and international experts, searching for advanced knowledge, and then teaching local people.

Another key mission is to share data, knowledge, and technology within the Caribbean region, which is beneficial to joint development.

A useful “shortcut” is to establish a hub on the blue economy [5]. Such a hub could be an effective, creative, and inclusive shared platform that exchanges data and knowledge between governments and interested communities. It also helps to address research and technology gaps between different countries. To completely make good use of the hub, a regional cooperation is required and governments need to systematically identify the demands for developing the blue economy.

5 Conclusion

The research has analyzed why should Caribbean countries develop the blue economy from perspectives of economics, environment, and social well-being. It is suggested that Caribbean countries have a good foundation and strong demand. Caribbean states also face a series of challenges that block the path to the blue economy, so they need to take action. A comprehensive ocean governance framework that contains formal and informal actors in the region can help to slow down the pace of ocean degradation. As main financial support approaches, blended finance and debt-for-nature swaps reduce the

financial stress on most Caribbean countries. Improving education and research capacity offer intellectual and technological support, which is beneficial to the blue economy in a long term. In the future, research on the Caribbean blue economy can focus on the impact of COVID-19, which may provide more economic and political suggestions to the Caribbean organizations and governments.

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