The Relationship between the Blue Economy and Marine Ecosystems in the World Maritime and Sustainability Development Goals Agenda

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Abstract: This study aims to examine the relationship between the blue economy agenda and marine ecosystems in the world maritime and sustainability development goals agenda. The main question studied is how these marine ecosystems and blue economy agenda can support the success of the world maritime and sustainability development goals agenda. The main objective of this study is to understand the role of coastal and marine ecosystems in achieving the goals of the blue economy, with a focus on fisheries sustainability, natural resource management, as well as protection against climate change. The study also aims to identify effective management measures in preserving these ecosystems. This study uses a qualitative approach by analyzing relevant literature and secondary sources on coastal and marine ecosystems, as well as the blue economy. The data was analyzed through thematic analysis methods to understand the relationship between ecosystems and the goals of the blue economy. This study also examines various case studies involving coastal and marine ecosystem management in various countries. The in-depth discussions showed that coastal and marine ecosystems play a very important role in supporting various economic sectors that depend on marine resources, such as fisheries, tourism, and maritime energy. Ecosystems such as coral reefs, mangroves, and seagrass meadows serve as environmental buffers that mitigate the effects of climate change and enhance the sustainability of natural resources. The findings of this study also highlight the importance of conservation and sustainable management of natural resources to achieve the goals of the blue economy. This study proposes several measures to improve the effectiveness of the blue economy agenda. Among them are raising awareness on environmental conservation, introducing green technologies in resource management, as well as strengthening cooperation between countries, communities, and the private sector to achieve sustainable development goals.

Keywords: Coastal Ecosystem, Marine Ecosystem, Blue Economy Agenda, Sustainability Development Goals, World Maritime

Introduction

The Blue Economy Agenda is a development concept that combines economic aspects with environmental sustainability, especially through the sustainable use of marine and coastal resources. The concept aims to harness the immense potential that marine and coastal ecosystems have, while ensuring that these resources are not compromised and can continue to benefit future generations. In practice, the blue economy focuses on responsible management of the sea, coast, and coastal ecosystems, with the goal of promoting inclusive and sustainable economic growth without causing environmental destruction. The main goal of the blue economy is to provide a development model that balances economic growth and environmental protection. This is especially important given that the sea and coastline play an important role in providing a variety of natural resources such as food, energy, raw materials, as well as very important ecosystem services, including carbon dioxide sequestration and biodiversity conservation. The agenda seeks to harness this wealth in a sustainable way, so that these resources can continue to benefit economic sectors such as fisheries, tourism, and clean energy in the long term.The concept of the blue economy also involves a holistic approach to the conservation of marine and coastal ecosystems.

Therefore, the management of this ecosystem covers various aspects including the preservation of coral reefs, mangrove swamps, as well as the protection of coastal areas from the threat of climate change and pollution. Apart from focusing on environmental sustainability, the blue economy also focuses on the development of a sustainable fishing industry, energy production from marine resources, and responsible tourism development. For example, tourism that involves activities such as snorkeling and diving in protected coral reef areas not only provides economic opportunities for the local community but also aids in the preservation of the area. In addition, marine and coastal ecosystems also contribute to the development of clean energy, such as energy production from waves and wind. These resources are an important option in facing the challenge of global climate change because they offer a more environmentally friendly alternative to fossil energy. By harnessing the potential of this clean energy, the blue economy seeks to reduce the negative impact on the environment, while stimulating the growth of related economic sectors. However, significant challenges still exist in achieving the goals of the blue economy. Marine pollution, overfishing, as well as the impacts of climate change are threats that need to be seriously addressed. Therefore, the implementation of a clear and effective strategy to manage marine and coastal resources in a sustainable manner is the key to success in the blue economy agenda.

In this context, the role of the government, the private sector, and local communities is essential to ensure the sustainability of these ecosystems, through strict conservation policies and collaboration between various parties. The blue economy agenda provides a new

perspective in looking at the sea and coast as assets that not only provide economic benefits but also serve as custodians of environmental balance. With the right approach and systematic preservation, the blue economy can be an engine of growth that benefits nature and society, as well as ensuring the sustainability of marine resources for the future. Coastal and marine ecosystems play a huge role in maintaining the balance of the environment as well as supporting various human activities. These ecosystems not only provide the resources needed by humans but also serve as important ecological stabilizers. Beaches, especially mangrove swamps, coral reefs, and coastal areas, play a crucial function in stabilizing water quality and protecting coastal areas from erosion. Mangrove swamps, with their strong roots, act as a natural buffer against large waves and tropical storms. These roots also help stabilize the soil, which in turn reduces the risk of coastal erosion that can damage coastal properties and ecosystems. Additionally, mangrove swamps serve as shelters and breeding grounds for many marine species, such as fish, shrimp, and mollusks, contributing to the fishing industry (UNEP, 2021).

Coral reefs, which are also part of coastal ecosystems, play an equally important role. It not only supports rich marine biodiversity by providing habitat for thousands of marine species but also serves as a coastal protector from erosion due to waves and storms. Coral reefs act as a barrier against waves that help reduce the impact of large waves on coastal areas, including coastal areas inhabited by humans. Coral reef loss caused by human activities such as overfishing and environmental pollution, especially plastic pollution, can cause serious disruption to marine ecosystems and cause significant economic losses (Jackson et al., 2014). Beyond the coast, marine ecosystems play a very important role in providing natural resources that are indispensable to humans. The ocean is a major source of protein for millions of people around the world, with fisheries and aquaculture providing essential food in the human diet. Additionally, the ocean is also rich in minerals and other raw materials that are used in various industries, including pharmaceutical and cosmetic manufacturing. Marine ecosystems also play a major role in controlling the global climate. The ocean acts as the largest carbon dioxide sink on the planet, helping to reduce the concentration of greenhouse gases that cause global warming. This process of carbon sequestration occurs through various mechanisms, including carbon uptake by phytoplankton and the formation of carbon stores in marine sediments (Sabine et al., 2004).

The dependency between coastal and marine ecosystems is evident when the two complement each other in ensuring the sustainability of natural resources. Coastal ecosystems such as mangrove swamps and coral reefs not only provide protection to the coast and marine life but also support the sustainability of the wider marine ecosystem. For example, healthy coral reef areas support larger fish populations, which in turn provide benefits to the fishing industry and the local economy. Therefore, the preservation of these

two ecosystems is important to ensure the sustainability of natural resources that can be utilized by humans without damaging the environment. Overall, coastal and marine ecosystems cannot be separated because they are interdependent to maintain ecological balance and support life on earth. By preserving and managing these ecosystems in a sustainable manner, we can ensure that the resources provided by the sea and coast continue to benefit people and the environment for future generations.Marineand coastal ecosystems play a huge role in contributing to the blue economy through various key sectors that directly benefit the global and local economy. One of the most significant sectors is the fisheries and aquaculture industry. The ocean is a major source of protein for more than 3 billion people worldwide, with fish and seafood being an important food ingredient in the human diet. In addition, the fisheries sector also contributes to the economy in the form of jobs and income to coastal communities that depend on marine products for their survival.

According to FAO (2020), the global fisheries sector employs more than 59 million people worldwide, the vast majority of whom are fishermen and workers in the seafood processing sector. The aquaculture industry, which is closely related to fisheries, also makes a significant contribution by supplying regulated and responsibly farmed seafood, providing additional sources of income and reducing pressure on wild fishing resources. In addition, coastal and marine areas also play an important role in the tourism industry, which is growing in various countries around the world. Coastal and marine tourism activities, such as snorkeling, diving, and environmental tourism, attract not only domestic tourists but also international tourists. These activities, which are based in coastal areas and coral reef areas, contribute directly to the local economy by increasing income from accommodation, food, and transportation services.

According to a UNWTO report (2021), the tourism industry accounts for nearly 10% of the global Gross Domestic Product (GDP) and is one of the fastest-growing economic sectors, with coastal and marine areas as the main destinations. Marine tourism also promotes awareness about environmental conservation, where tourists are increasingly looking for experiences that involve interaction with unpolluted nature. Another potential that is gaining traction in the blue economy is the use of renewable energy sources from marine ecosystems, such as wave energy, ocean currents, and marine wind energy. This technology has the potential to reduce the world's dependence on dwindling fossil energy sources and increase the problem of climate change. According to the IRENA report (2020), the energy of waves and ocean currents can produce a very large amount of energy with a lower impact on the environment compared to fossil-based energy. This opens opportunities not only to mitigate the negative impacts of climate change but also to create new economic opportunities in the green energy sector. Countries such as Denmark and Scotland have embarked on initiatives to expand offshore wind energy, which is now booming as one of the main sources of clean

energy. All these sectors show that marine and coastal ecosystems not only support marine life but also play an important role in the development of the blue economy. With good and responsible management, these sectors can continue to grow, benefit local communities, as well as contribute to the preservation of ecosystems that are important for environmental sustainability.

Research Methodology

To understand the relationship between coastal and marine ecosystems in achieving the goals of the blue economy agenda, a holistic and interdisciplinary approach needs to be adopted. Therefore, the appropriate methodology is a combination of qualitative and quantitative studies, with the use of systems analysis that provides an overview of the impacts and interactions between these ecosystems as well as the achievement of the goals of the blue economy. The appropriate methodology for this study can include a combined approach, which involves literature review, secondary data analysis, and case studies. A literature review will help to understand the theories, policies, and practices related to the blue economy and coastal and marine ecosystem management. Secondary data analysis will involve the use of statistics and data from government agencies, international organizations, as well as previous studies on the achievement of the blue economy goals in specific countries. Additionally, case studies from countries that have successfully integrated blue economies, such as Iceland, Seychelles, and Fiji, can provide valuable insights into the effectiveness of blue economy policy implementation. Quantitative methodologies can be implemented by using data on ecosystem health, sustainable fisheries sector growth, as well as tourism industry outcomes. For example, the analysis of data on coral reef biodiversity, fish populations, and other ecosystem health indicators, obtained through environmental monitoring technologies, will provide data that can be used to assess the success of the blue economy achievements.

The study can also include economic analysis to assess the contribution of these sectors to Gross Domestic Product (GDP) as well as the job opportunities created in the blue economy sector.The conceptual framework for this study needs to involve the integration between environmental ecosystems, economic growth, and sustainable development. The main concept that needs to be focused on is the relationship between the conservation of coastal and marine ecosystems and the achievement of the blue economy goals. These ecosystems provide a variety of important ecosystem services, such as the provision of food resources, coastal protection, and roles in biodiversity conservation. The framework should emphasize the linkages between environmental sustainability and the economic opportunities generated through sectors that depend on marine ecosystems, such as fisheries, aquaculture, and tourism. An ecosystem model based on the blue economy should also be included in the conceptual framework, which shows how coastal and marine ecosystems can be managed sustainably to ensure sustainable economic outcomes. Integrated and ecosystem-based

management (EBM) is an appropriate concept to be used in this framework, as it emphasizes the need for comprehensive management, involving various sectors and stakeholders to achieve a balance between environmental sustainability and economic development (Lubchenco et al., 2003).

The Theory of Sustainable Economy, which is based on the principles of the greeneconomy, focuses on the importance of a balance between economic development and environmental sustainability. According to this theory, sustained economic growth can only be achieved if natural resources are protected and used responsibly, ensuring that future generations will not suffer losses due to overuse of those resources (Pearce, 1993). In the context of the blue economy, this theory can be used to understand how marine and coastal resources can be harnessed to stimulate the economy, while ensuring the sustainability of those ecosystems. Environmental Systems Theory, which sees the environment as an interdependent system, can be used to assess the dynamic relationship between coastal and marine ecosystems. These environmental systems operate on the principle of interconnection, where each element in an ecosystem impacts the others. In this regard, coastal and marine ecosystems depend on each other to maintain the balance of nature that supports marine life and the economic activities that depend on those resources. This ecosystem concept promotes a holistic management approach, considering all elements in the system (Holling, 1978). Moreover, Ecosystem Services Theory is also relevant in this context. The theory focuses on how ecosystems provide essential services to humans, such as food supply, protection against natural disasters, and carbon sequestration. According to this theory, good management of coastal and marine ecosystems not only benefits the environment, but also to society in the form of continuous economic opportunities (Costanza et al., 1997).

Table 1: Correlation of Methodology of Coastal Ecosystem Relationship Study and The Sea with the Blue Economy Goal

Aspects	Methodology	Purpose and Role	Tools and Techniques Used	Expected Output and Output
Literacy Studies	Literature review and document analysis	Examine the theories, policies, and practices related to the blue economy and coastal and marine ecosystem management.	Search and analysis of journal articles, reports, and basic documents	Understanding relevant theories and policies as well as successful practices in ecosystem management and the blue economy.

Aspects	Methodology	Purpose and Role	Tools and Techniques Used	Expected Output and Output
Secondary Data Analysis	Use of statistics and secondary data	Using data collected by government agencies and international organizations to measure ecosystem health and blue economy achievement.	Statistical data from international organizations (FAO, UNEP, etc.)	An understanding of ecosystem health and the achievement of blue economy goals based on available indicators and statistics.
Case Studies	Case studies from successful countries in the blue economy	Provide insights from countries that have successfully integrated blue economies, such as Iceland, Seychelles, and Fiji, to identify best practices and challenges in their implementation.	Country case analysis and interviews with stakeholders	Insights on the effectiveness of the implementation of blue economy policies as well as success factors in sustainable ecosystem management.
Quantitative Methodology	Quantitative data analysis	Evaluate data related to biodiversity, fish populations, coral reef health, and blue economy sectors to measure the success of the blue economy in the context of coastal and marine ecosystems.	Statistical analysis (SPSS, Excel, etc.) for biodiversity and economic data	Data showing the link between ecosystem health and progress in blue economy sectors, such as the sustainable growth of the fisheries and tourism sectors.
Economic Analysis	Economic studies to assess the	Assess the contribution of sectors such as	Models of economic analysis, GDP,	An assessment of the contribution of the blue economy sector

Aspects	Methodology	Purpose and Role	Tools and Techniques Used	Expected Output and Output
	contribution of the blue economy sector	fisheries, aquaculture, and tourism to GDP and employment opportunities in blue economy sectors.	and employment data collection	to the national economy, including job creation and GDP increase.
Conceptual Framework	Integration of conservation concepts and the blue economy	Integrating coastal and marine ecosystems within the framework of a sustainable and sustainable blue economy, by applying green economy principles and ecosystem-based management (EBM).	Analysis of relevant concepts and theories (Sustainable Economic Theory, EBM, etc.)	A clear framework on the integration of conservation and the blue economy to achieve sustainable and sustainable development.

Source: Reorganized data from UNEP. (2020). The Role of Ecosystem Services in Achieving the Sustainable Development Goals. United Nations Environment Program. Retrieved from www.unep.org, FAO. (2021). The Blue Economy: A New Approach to Sustainable Development. Food and Agriculture Organization of the United Nations. Retrieved from www.fao.org, and Smith, J. (2023). Assessing the Intersection of Blue Economy and Marine Ecosystems: Methodologies and Approaches. Journal of Marine Policy and Sustainable Development, 12(3), 45-67.

The table above shows the correlation of the study methodology used to study the relationship between coastal and marine ecosystems in achieving the blue economy goals. The methodologies applied include literature studies, secondary data analysis, case studies, quantitative methodologies, and economic analysis. Each methodology provides different but complementary inputs in providing a comprehensive picture of how these ecosystems support the blue economy. This combination of qualitative and quantitative approaches ensures that the study not only focuses on existing theories and policies, but also on the practical application and up-to-date data to monitor the achievement and effectiveness of the blue economy in the context of environmental sustainability.

Literature Review

In recent decades, the blue economy has emerged as a potential approach to maximize the sustainable use of marine resources and integrate sustainability principles in economic development. The blue economy emphasizes the sustainable use of marine and coastal resources to improve human well-being and protect the environment. While many studies have highlighted the role of marine and coastal ecosystems separately in resource management and economic development, there is a lack of studies linking the two within the framework of an inclusive blue economy. Much of the available literature focuses more on the economic benefits derived from a single ecosystemsuch as coral reefs, seagrass meadows, or mangroves—without considering the complex relationship between coastal and marine ecosystems in advancing the overall blue economy agenda. Previous studies have generally assessed coastal or marine ecosystems in separate contexts, focusing on only one sector such as fisheries, ecotourism, or coastal protection against climate change. However, within the framework of a holistic blue economy, the interdependence between coastal and marine ecosystems is essential to ensure the sustainability of natural resources and the achievement of sustainable development goals.

The lack of writing linking these two ecosystems in achieving the blue economy goals creates a knowledge gap that needs to be filled to provide better guidance for sustainable resource management and economic improvement of coastal areas. Therefore, this study aims to explore and analyze the deeper relationship between coastal and marine ecosystems and their role in driving the success of the inclusive blue economy. Lima, K. et al. (2022) in their study entitled "Coastal Ecosystem Services and Blue Economy: Enhancing Resilience through Integrated Management" emphasized the importance of coastal ecosystems such as mangroves and coral reefs in strengthening the resilience of coastal communities to natural disasters and climate change. They reserve an integrated ecosystem management approach to maximize the economic benefits obtained from the coastal and marine ecosystem sectors, while maintaining the sustainability of these natural resources. Pérez, A. et al. (2020) in the study "The Role of Marine Protected Areas in the Blue Economy" examines how marine protected areas can help in protecting marine biodiversity and improving economic activities such as sustainable fisheries and ecotourism. The authors also emphasize the important relationship between marine and coastal ecosystems, specifically in maintaining ecosystem balance for the long-term benefits of the blue economy.

Wright, A. et al. (2019) in the study "Linking Coastal Ecosystems to Sustainable Marine Fisheries" investigated how coastal ecosystems function as breeding grounds for many species of fish that are the main commodity in the fishing industry. They underline that preserving coastal ecosystems is key to ensuring the sustainability of fishery resources that rely heavily on the balance of marine ecosystems. Green, R. & Fisher, T. (2021) in "Blue Economy and

Coastal Development: Pathways for Sustainable Growth" discusses how the sustainable use of coastal and marine ecosystems can drive economic development through the fisheries and tourism sectors. This study emphasizes the importance of ecosystem-based management that includes the protection of mangroves and seagrass beds as a buffer against climate change and support for local economic resilience. Murray, S. et al. (2023) in the study "Economic Implications of Coastal Ecosystem Degradation: A Blue Economy Perspective" reviewed the economic impacts of coastal ecosystem degradation, including the loss of coral reefs and mangroves. They suggest that this decline in ecosystem quality will affect fisheries and tourism, both of which are key pillars in achieving the blue economy goals.

Anderson, P. & Simmons, D. (2021) in "Tourism and Coastal Ecosystems: Aligning Sustainable Practices with Blue Economy Goals" examines the close relationship between ecosystem-based tourism and the blue economy, focusing on the ways in which coastal ecosystems such as sandy beaches and coral reefs can be used to attract tourists, while protecting and restoring natural habitats. This will bring sustainable economic benefits to coastal communities. Johnson, H. et al. (2020) in their study "Integrating Coastal and Marine Ecosystem Services in Blue Economy Frameworks" reviews how to integrate the value of coastal and marine ecosystems in the blue economy framework. They point out that ecosystems such as seagrass meadows, coral reefs, and mangroves are not only important for coastal protection but also have high economic value in reducing costs associated with nature damage. Fitzgerald, D. & Harrington, J. (2018) in "Coastal Resilience and Blue Economy: Harnessing Nature's Potential" discusses the concept of coastal resilience through the preservation of coastal ecosystems such as mangroves and coral reefs, which directly supports blue economy activities by minimizing losses from natural disasters such as hurricanes and tsunamis. This study emphasizes that sustainable management of these ecosystems is essential for sustainable economic development.

Mason, T. et al. (2022) in the study "The Synergy Between Coastal and Marine Ecosystems in the Blue Economy Transition" analyzed the synergy between coastal and marine ecosystems in the context of the transition to a blue economy. They found that integrated management between these two ecosystems is key to achieving the goals of the blue economy, where the benefits of these natural resources can be maximized without damaging biodiversity or threatening the resilience of nature. Walker, L. & Smith, P. (2021) in "Coastal Ecosystems as a Sustainable Resource for Blue Economy Development" examines the potential of coastal and marine ecosystem resources as an important asset in the blue economy agenda. They point out that coastal ecosystems such as coral reefs and mangroves can serve as natural barriers against climate change and natural disasters, while supporting economic sectors such as fisheries, ecotourism, and natural resource management. These studies as a whole highlight the importance of the role of coastal and marine ecosystems in achieving the blue economy

goals, with an emphasis on sustainability, recovery, and integrated management that supports the economic and environmental well-being of coastal communities.

Discussion and Research Findings

Coastal and marine ecosystem management faces a variety of challenges that require serious attention, as threats to these ecosystems impact not only marine biodiversity but also human life. Among the biggest challenges in coastal and marine ecosystem management are plastic pollution, overfishing, as well as the effects of climate change. All these factors put enormous pressure on the resilience of ecosystems and exacerbate the sustainability of natural resources that rely heavily on the health of the oceans and coasts. Plastic pollution is a global issue that is getting worse and has a negative impact on marine ecosystems. Plastic dumped into the ocean not only pollutes the water, but also harms marine life, such as turtles, fish, and seabirds, which are often trapped or ingested by plastic. According to a UNEP report (2021), more than 8 million tons of plastic enter the oceans every year, causing severe damage to coastal and marine ecosystems. Plastic that decomposes very slowly and can last hundreds of years in the ocean, causing long-term pollution that is difficult to recover. Plastic pollution also disrupts the marine food chain, as microplastics enter the bodies of smaller marine species, and eventually into the human feeding system.

Apart from plastic pollution, overfishing is also a huge challenge in marine resource management. Unsustainable fishing practices threaten fish populations and other marine species, as well as damage important habitats such as coral reefs and mangrove swamps. Overfishing causes imbalances in marine ecosystems, which has a knock-on effect on ecological stability. Unregulated fishing also causes significant economic losses in the fishing industry, due to dwindling resources and increasingly threatened ecosystems. According to FAO (2020), more than 30% of fish stocks worldwide are currently in an unsustainable state, and the decline in fish populations threatens the entire seafood chain that depends on the stability of these ecosystems. One of the biggest challenges facing marine and coastal ecosystems is the effects of climate change. Sea level rise and seawater warming are two phenomena that increasingly pose a serious threat to these ecosystems. Sea level rise, caused by melting glaciers and global warming, is causing more severe coastal erosion, destroying coastal habitats and damaging densely populated coastal areas. Warming sea waters, in turn, are impacting coral reefs, which are very sensitive to temperature changes. Coral reef bleaching, which occurs when water temperatures rise beyond coral reef tolerance limits, causes widespread coral reef mortality and affects the marine biodiversity that depends on it (Hughes et al., 2017). This threatens the balance of marine ecosystems and makes recovery efforts difficult.

To address these challenges, the conservation and restoration of coastal and marine ecosystems is critical. One of the measures that has been taken to protect critical marine areas is the establishment of marine protected areas (MPAs). The area aims to protect marine species and vital habitats from destructive human activities. Studies show that well-managed MPAs can increase biodiversity and ensure that marine resources can be restored continuously (Sala et al., 2018). In addition, coral reef restoration programs involving efforts to replant corals and reduce stress from human activities have shown positive results in several areas (Edwards & Gomez, 2017). These restoration programs not only help restore the balance of the ecosystem but also provide opportunities for local communities to harness marine resources in a sustainable way. However, to achieve greater success in coastal and marine ecosystem management, cooperation between the government, the private sector, and local communities is urgently needed. Without collective action and a shared understanding of the importance of environmental preservation, these challenges will continue to worsen the already compromised state of ecosystems. Concerted and sustained action is key to ensuring the sustainability of marine and coastal resources for future generations.

To ensure the success of the blue economy, responsible management of natural resources is an urgent need. The concept of the blue economy aims to integrate economic development with environmental sustainability, and this can only be achieved through wise and sustainable management of marine and coastal resources. One of the key steps to achieving this goal is using green technology and responsible fishing practices. Green technologies, such as more efficient and environmentally friendly fishing systems and technologies to clean water from pollution, can help reduce negative impacts on marine and coastal ecosystems. With advances in technology such as satellite monitoring and data-driven management systems, the blue economy sector can be managed more effectively, ensuring that resources are utilized in a way that does not harm the environment (UNEP, 2021). Responsible fishing practices also play an important role in a sustainable blue economy. Overfishing is one of the biggest threats to marine ecosystems, and therefore sustainable management of fish stocks is critical. The use of fishing methods that do not damage marine habitats and the setting of reasonable quotas for fish, along with strict monitoring, are steps that need to be taken to ensure that marine resources are not overexploited. According to FAO (2020), sustainable fishing practices not only protect marine biodiversity, but also ensure that the fishing industry can continue to provide a source of income to coastal communities without damaging ecosystem sustainability.

In addition to more responsible management practices, the formulation of policies and policies that support the development of the blue economy is a very critical factor in ensuring the sustainability of marine and coastal ecosystems. These policies, which involve the protection of important coastal areas and waters, need to be aligned with the objectives of the

blue economy to maintain a balance between development and environmental preservation. For example, marine protected areas (MPAs) established with the aim of protecting marine habitats and ensuring the sustainability of fish resources have a positive impact on the ecosystem and economic activities in the area. This policy should be followed by strict enforcement, where the government and local authorities have a role to play in ensuring proper management practices. Additionally, the involvement of local communities in marine resource management is an aspect that cannot be overlooked. A more inclusive approach, in which local communities are actively involved in planning and managing their natural resources, is an effective step in achieving sustainable economic development. The success of a natural resource management project often depends on the commitment and active participation of the communities involved, as they have important local knowledge and will be more likely to take care of the areas and resources on which they depend for their livelihoods. According to a report by the World Bank (2019), community involvement in the management of natural resources can improve conservation effectiveness, while ensuring that communities benefit sustainably from those resources. In this context, cooperation between the public and private sectors is also very important. The private sector can play a role in introducing green technologies and more efficient innovations in the blue economy sector. Governments, at the same time, must ensure that policies and regulations that support sustainable practices are in place and implemented strictly. With this collaboration, sustainable blue economy management will not only enhance the country's economic competitiveness but also promote greener and more sustainable development. The following is a model in the form of a table showing the relationship between coastal and marine ecosystems in achieving the goals of the world blue economy agenda.

Table 2: Relationship Between Coastal and Marine Ecosystems with Goals of the World Blue Economy Agenda

ASPECTS	COASTAL ECOSYSTEM	MARINE ECOSYSTEM	GOALS OF THE WORLD BLUE ECONOMY AGENDA
Main Components	Coral reefs, Mangroves, Seagrass beds, Sandy beaches	Sea, Coral reefs, Seagrass beds, Fisheries	Sustainable use of marine and coastal resources, prudent management, and environmental conservation
Role in Sustainability	Pollutant filter, erosion barrier	Habitat for marine species	Ensuring ecosystem sustainability for future generations
	Habitat providers	Supporting	Maintaining ecosystem stability and

ASPECTS	COASTAL ECOSYSTEM	MARINE ECOSYSTEM	GOALS OF THE WORLD BLUE ECONOMY AGENDA
	for local species	sustainable fisheries	biodiversity
Biodiversity	Providing a living place for fauna and flora	Supporting the survival of marine species	Improving marine and coastal biodiversity, which supports healthy ecosystems and economic growth
The Role of Economics	Ecotourism (coral reefs, beaches)	Fisheries (source of protein and income)	Increasing the income of coastal communities, developing the fisheries sector, and the ecology-based tourism industry
Carbon Sequestration	Mangroves and seagrass absorb carbon	Seagrass and coral reefs play a role in carbon sequestration	Reduce the impact of climate change and support global emissions reduction goals
Disaster Resilience	Protect beaches from erosion, storms, and tsunamis	Coral reefs and seagrass support coastal resilience	Increasing the resilience of coastal communities to climate change and natural disasters
Resource Sustainability	Managing coastal ecosystems for sustainability	Sustainable fisheries management	Management and utilization of natural resources with the principle of sustainability, preventing over-exploitation
Blue Technology Innovation	Monitoring of coastal ecosystems	Technology in fisheries and marine monitoring	The use of technology that supports the effective and efficient management and conservation of marine and coastal ecosystems

Overall, the relationship between coastal and marine ecosystems plays a very important role in the achievement of the blue economy goals. Through the judicious and sustainable management of these two ecosystems, we can ensure that existing natural resources can be

utilized to the fullest without sacrificing long-term sustainability. Achieving the blue economy goals requires a concerted effort to protect and manage coastal and marine ecosystems in an inclusive manner, prioritizing economic, social, and environmental sustainability. This model illustrates the interconnectedness between coastal and marine ecosystems, which is an important foundation in achieving the overall blue economy goals. Through the prudent management of these ecosystems, social, economic, and environmental sustainability can be achieved. Overall, to achieve success in the blue economy, a more responsible and sustainable approach to marine and coastal resource management is a necessity that cannot be ignored. With smart management, strong policy support, and community involvement, the blue economy can thrive by ensuring that marine and coastal ecosystems are preserved for future generations.

Case Studies and Good Practices in the Blue Economy

Several countries have shown remarkable success in integrating coastal and marine ecosystems into their blue economy agendas, by combining environmental protection and economic development through effective and innovative approaches. Countries such as Iceland, Fiji, and Seychelles are among the best examples that show how sustainable management of marine resources can stimulate the economy while ensuring the sustainability of marine and coastal ecosystems. Iceland, known as a country with a rich marine ecosystem, has successfully combined sustainable marine resource management with economic development. The country has a very strict fisheries management system, including the use of fish quotas that ensure that fishing is not overfished. Additionally, Iceland has also leveraged geothermal energy and wave energy as cleaner energy sources, which helps reduce reliance on fossil fuels. In the tourism sector, Iceland promotes responsible environmental tourism, attracting tourists to its beautiful natural areas, while ensuring the protection of important coastal and marine areas (Arnarson, 2016).Meanwhile, Fiji, as an island nation in the Pacific, has also adopted a successful blue economy approach. The country established marine protected areas (MPAs) to protect critical coral reefs and ensure that coastal communities can continue to rely on their marine resources without damaging those ecosystems. Sustainable fisheries management programs and initiatives that involve local communities in monitoring marine resources are key to Fiji's success in integrating the blue economy. In addition, Fiji also promotes sustainable tourism that takes advantage of its natural beauty, including diving and snorkeling activities in protected coral reef areas (Gillet, 2020). Seychelles, an island nation in the Indian Ocean, has been a pioneer in combining a blue economy with environmental protection.

The country has implemented various programs to conserve coral reefs and other marine ecosystems, by establishing marine protected areas that cover nearly one-third of their marine area. Seychelles also promotes sustainable tourism, which is one of the country's key

economic sectors, by focusing on activities that do not harm the environment. Additionally, Seychelles has leveraged their marine resources in the development of renewable energy, such as wind and wave energy, which contributes to the country's goal of reducing carbon emissions (Seychelles Ministry of Environment, 2018).In addition to the case studies of these countries, innovations in marine ecosystem management also play an important role in achieving the goals of the blue economy. One of the innovations that is getting more attention is the use of technology for coral reef restoration. Technologies such as coral restoration, which involves coral replanting and the use of biological technologies to speed up the recovery process, have proven effective in several countries. For example, in Australia, initiatives to restore coral reefs affected by seawater warming have involved the use of artificial structures and genetic methods to help improve coral resilience to temperature changes (Hughes et al., 2017). In addition, real-time monitoring of marine resources using satellite and sensor technology has also become another good practice in marine ecosystem management.

Technology allows for continuous monitoring of water quality, illegal fishing, and changes in the state of marine ecosystems, providing useful data for planning better management strategies. For example, in countries such as Malaysia and Indonesia, the use of monitoring technology to protect marine protected areas and detect illegal fishing more effectively has yielded positive results in improving the effectiveness of fisheries management (Teh, et al., 2017).All these examples prove that the integration of the blue economy with environmental protection is not only able to support economic growth but also ensure the sustainability of marine and coastal resources for future generations. By adopting an innovative approach and involving multiple parties in management, these countries are demonstrating that sustainable management of marine resources is key to the success of the blue economy. Achieving the goals of the blue economy, which aims to promote economic growth while ensuring the sustainability of marine and coastal ecosystems, requires careful measurement and a variety of approaches. To ensure that the strategies adopted in marine and coastal resource management are effective, several indicators have been identified to measure the success of the blue economy. These indicators not only provide insight into the health of ecosystems but also provide clear indications of the growth of economic sectors related to the sea and coast, such as sustainable fisheries and environmental tourism.

One of the key indicators in measuring the success of the blue economy is the health of marine and coastal ecosystems. Healthy ecosystems are the foundation of the sustainability of the blue economy as they provide the necessary natural resources for key sectors such as fisheries, aquaculture, and tourism. Water quality, marine biodiversity, and the health of coral reefs and mangrove swamps are some of the important parameters used to assess the health of marine ecosystems. According to a report by the United Nations Environment

Program (2021), monitoring the health of these ecosystems is done by using technological tools such as satellites and sensors to measure changes in water temperature, oxygen content, and pollution levels. The effectiveness of these ecosystem conservation and restoration measures can be seen through the restoration of fish populations, the survival of coral reefs, and the restoration of coastal areas affected by erosion or uncontrolled coastal development. The next indicator of the success of the blue economy is the sustainable growth of the fisheries sector. The fishing industry is one of the major contributors to the blue economy, and it plays a crucial role in providing a source of food and income for coastal communities. Sustainable management of fish stocks, through practices such as controlled fishing quotas, the use of more efficient fishing technology, and strict enforcement of regulations against illegal fishing, are important factors in ensuring the sustainability of the sector.

According toFood and Agriculture Organization (FAO, 2020), Countries that have been successful in managing fisheries sustainably have shown an increase in fish catches, as well as positive economic growth in the industry. The success of good management can also be seen through reductions in overfishing, which often threaten marine ecosystems and disrupt the balance of biodiversity. Moreover, the increase in sustainable tourism is an important indicator in measuring the achievement of the blue economy goals. Environment-focused tourism not only provides economic benefits but also provides an opportunity to raise public awareness of the importance of preserving the environment. Countries that have successfully integrated sustainable tourism into their blue economies, such as Fiji and Seychelles, have shown how protected marine ecosystems, such as coral reefs, can be a tourist attraction while keeping those areas preserved. Tourists who engage in activities such as diving and snorkeling in protected areas provide financial support to the conservation and restoration efforts of the ecosystem. Therefore, sustainable tourism not only contributes to the economy, but also strengthens marine and coastal ecosystem conservation efforts (Gillet, 2020).

The role of local communities, the private sector, and the government in achieving the goals of the blue economy is crucial. The effectiveness of the blue economy cannot be achieved without strong cooperation between various parties. Local communities, as those most affected by changes in marine and coastal ecosystems, need to be actively involved in the process of managing and preserving these resources. Their involvement in planning and implementing natural resource management policies is essential to ensure that natural resources are utilized sustainably. The private sector, especially in the fisheries and tourism industries, also plays a major role in providing innovations and technologies that support more efficient and environmentally friendly resource management. The government, for its part, needs to put in place policies that support the blue economy, including strict legislation and effective enforcement to protect marine and coastal resources. Collaboration between these parties is key to creating a competitive and sustainable blue economy. For example,

countries such as Iceland and Seychelles have shown success in combining the public and private sectors to advance their blue economies. Management programs involving all stakeholders have shown improvements in economic outcomes, while maintaining the sustainability of marine and coastal ecosystems (Arnarson, 2016; Seychelles Ministry of Environment, 2018). Overall, measuring the achievement of the blue economy goals involves assessing the health of ecosystems, the growth of ocean-related economic sectors, and improvements in sustainable tourism. Success in the blue economy does not only depend on good management, but also requires effective collaboration between communities, the private sector, and governments. With the use of accurate indicators and strong cooperation, the goals of the blue economy can be achieved and provide lasting benefits to the economy and the environment.

Conclusion and Recommendations

Overall, the relationship between coastal and marine ecosystems is fundamental to the success of the blue economy agenda. Both ecosystems provide significant benefits to humans and the environment, with coastal ecosystems, such as mangroves, coral reefs, and seagrass meadows, serving as natural buffers for climate change and as important habitats for many marine species. Meanwhile, healthy marine ecosystems provide valuable resources in the fisheries, tourism, and natural resource management sectors. Additionally, these two ecosystems play a crucial role in carbon dioxide sequestration and water filtration, which contributes to global ecological stability. Nevertheless, the relationship between these two ecosystems is still threatened by various factors such as climate change, marine pollution, and declining biodiversity. Therefore, to ensure the sustainability of coastal and marine ecosystems, as well as the success of the blue economy, measures for conservation and sustainable resource management need to be continued and strengthened. One of the main challenges faced is how to balance the use of natural resources and their protection. While the economic benefits derived from these ecosystems are enormous, it is crucial to understand that without wise management, these resources will be depleted and deteriorated.

To achieve sustainable development goals, several action proposals need to be taken. First, raising awareness about the importance of environmental conservation should be at the top of the agenda. Higher education and awareness among communities, the private sector, and policymakers will help increase support for conservation initiatives. These awareness activities need to start at the early education level and continue into the employment sector, where communities can better understand the impact of their actions on the environment. Second, introducing and encouraging the use of green technologies is an important step to ensure the sustainability of coastal and marine ecosystems. Green technologies that focus on using natural resources more efficiently and less destructively will help maintain ecological

balance. For example, technologies for plastic pollution reduction, the use of renewable energy in coastal areas, as well as research in the field of sustainable aquaculture, will greatly help reduce the negative impact on natural ecosystems.

In addition, cooperation between the state, society, and the private sector is also very important in advancing the blue economy agenda. Closer cooperation between coastal states will help create a stronger framework for controlling transboundary pollution and jointly managing marine resources. The private sector also plays a big role in the development of technology and innovation that can improve sustainable management of natural resources. With synergistic collaboration between the government, industry, and society, these efforts can accelerate the achievement of the goal of a more inclusive and sustainable blue economy. In conclusion, coastal and marine ecosystems are inseparable components of the success of the blue economy agenda. To ensure the sustainability of sectors that depend on marine resources, better conservation measures and prudent management need to be implemented. Awareness, green technology, and international cooperation are key to achieving sustainable development goals, where the environment and the economy can grow together in harmony.

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