

SEAQUEST

ACTIVITY 1.1

BASELINE ASSESSMENT AND STAKEHOLDER MAPPING

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SEAQUEST

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INTRODUCTION

The Blue Economy has emerged as a transformative concept that seeks to balance economic growth with environmental sustainability and societal well-being. It encompasses a broad range of ocean-related activities, including fisheries, aquaculture, marine energy, maritime transport, and coastal tourism. The importance of the Blue Economy lies not only in its capacity to generate economic value and employment but also in its potential to preserve and enhance the health of marine ecosystems, a critical component of the planet's ecological balance.

Various global organizations and institutions have defined the Blue Economy in nuanced ways, reflecting its diverse dimensions. The World Bank describes it as "the sustainable use of ocean resources for economic growth, improved livelihoods, and jobs while preserving the health of ocean ecosystems." Similarly, the European Commission expands this definition to include "all economic activities related to oceans, seas, and coasts," highlighting its interconnected and multifaceted nature.

Other perspectives enrich our understanding of the concept. The Commonwealth of Nations emphasizes stewardship, calling the Blue Economy "an emerging concept which encourages better stewardship of our ocean or 'blue' resources." Conservation International adds that the Blue Economy includes not only market-driven activities but also "economic benefits that may not be marketed, such as carbon storage, coastal protection, cultural values, and biodiversity." These viewpoints underscore the necessity of integrating ecological preservation with economic objectives.

The Center for the Blue Economy provides a comprehensive take, noting three distinct but related aspects of the term: the oceans' overall contribution to economies, the importance of environmental and ecological sustainability, and the potential for growth in ocean-related sectors across both developed and developing countries. The United Nations further broadens the perspective, defining the Blue Economy as encompassing all sectors and policies that determine whether the use of ocean resources is sustainable.

It highlights the critical challenge of managing oceanic sustainability while addressing issues such as sustainable fisheries, ecosystem health, and pollution prevention. According to the UN, achieving these goals requires unprecedented collaboration across borders and sectors, particularly for Small Island Developing States (SIDS) and Least Developed Countries (LDCs), which face unique resource and capacity constraints.

The Blue Economy is also integral to global sustainability efforts, directly contributing to the United Nations' Sustainable Development Goals (SDGs), particularly Goal 14: Life Below Water. This goal calls for the conservation and sustainable use of oceans, seas, and marine resources, reinforcing the critical role of oceans in fostering a sustainable future.

In this context, Activity 1.1 seeks to advance the understanding and development of the Blue Economy within the Black Sea Basin region. It comprises two distinct yet interconnected stages: Baseline Assessment and Stakeholder Mapping.



The Baseline Assessment involves a comprehensive analysis of the current state of the Blue Economy, focusing on its key sectors, the integration of innovative technologies, and existing sustainability practices. It also aims to identify gaps and opportunities for improvement. Stakeholder Mapping, the second stage, centers on identifying, categorizing, and engaging key stakeholders who influence or are impacted by the Blue Economy. By mapping their roles, interests, and influence, this stage will guide the formation of an inclusive, sustainable, and transnational network that fosters collaboration and shared responsibility.

Together, these efforts aim to establish a robust foundation for future initiatives in the Black Sea Basin. By aligning with global definitions and priorities for the Blue Economy, Activity 1.1 seeks to position the region as a leader in sustainable ocean resource management and cross-border cooperation.

Understanding the Blue Economy: A Framework for Sustainable Growth

Much of our work in sustainable fisheries, tourism development, and efforts to tackle plastic pollution is intrinsically tied to what is often referred to as the "Blue Economy." In the coming year, we plan to share Insights and Impact Stories that reflect the progress and outcomes of this collective work. As part of this, we want to offer our readers a foundational understanding of what the Blue Economy is, how it is described, and the various sectors it encompasses.

What is the Blue Economy?

The term "Blue Economy" was first coined by Belgian economist Gunter Pauli in 1994, in response to a United Nations request for recommendations related to COP3 in Japan, where the Kyoto Protocol was established in 1997. The Blue Economy encompasses all economic activities related to the oceans, seas, and coastal regions. This includes industries such as renewable marine energy, maritime transport, fishing, coastal tourism, and the development of innovation ecosystems along shorelines. It also involves non-production sectors like marine research, development (R&D), and education.

The Blue Economy represents a massive and rapidly expanding sector, with an estimated annual value of \$1.5 trillion according to the World Bank. By 2030, this sector is projected to double in size, reaching \$3 trillion per year and supporting the livelihoods of approximately 3-4 billion people globally.

Components and Structure of the Blue Economy

The Blue Economy consists of several key sectors that contribute to its growth. These include renewable energy, fisheries, offshore transport and engineering, and coastal communities. Additionally, specialized activities within these sectors, such as marine biotechnology, sustainable aquaculture, and carbon sequestration, are rapidly emerging as critical components.

Discussions about the Blue Economy often focus on its economic value, sometimes overlooking the essential need to balance economic growth with the sustainability of marine resources and the health of coastal communities. Climate change risks, resource depletion, and ecosystem degradation are key challenges that must be addressed to ensure the long-term viability of the Blue Economy. Most governments and organizations are increasingly recognizing the need to align economic development with the preservation of marine ecosystems. Madhushree Chatterjee, Secretary of UN-Water, emphasizes that the Blue Economy involves a range of economic sectors and policies that together determine whether the use of ocean resources remains sustainable. This holistic approach underlines the importance of sustainability in ensuring that the benefits of the Blue Economy are both enduring and inclusive.

The Blue Economy and Sustainable Development

As the Blue Economy continues to expand, it must integrate sustainability at its core. Many regions around the world, especially developing nations, lack the policies and infrastructure necessary to effectively manage marine resources. This gap underscores the importance of creating policies that not only promote economic activity but also safeguard ocean ecosystems.

Andrew Hudson, Head of the UNDP Water and Ocean Governance Programme, highlights the dual nature of the Blue Economy.

He argues that the Blue Economy is not merely a question of weighing benefits against challenges. Instead, it represents two intertwined elements: first, the need to protect and restore the ocean's resource base, which sustains billions of people through food and livelihoods, and second, the potential for new, sustainable economic opportunities that emerge from the ocean's vast resources.



Sustainability as an Opportunity in the Blue Economy

Hudson's framework presents both the protection of marine ecosystems and the creation of new sustainable industries as key opportunities for the Blue Economy. This approach is crucial for addressing complex global challenges like climate change, biodiversity loss, and resource depletion. Industries such as offshore renewables, blue biotechnology, sustainable aquaculture, and ocean deacidification offer significant economic potential while also advancing sustainability goals.

To unlock this potential, increased investment in scientific research, policy development, and innovative finance is essential. New financial models and partnerships can provide the necessary capital to support both environmental protection and economic growth in the Blue Economy. These investments must be backed by strong governance frameworks that balance economic and ecological priorities.

Private sector engagement is also critical. Multinational discussions on climate, biodiversity, and the UN SDGs increasingly recognize the role of the private sector in driving the transition toward a sustainable Blue Economy. Effective partnerships, particularly those that bring together public, private, and philanthropic sectors, will be vital to overcoming the challenges of sustainability and maximizing the potential of ocean-based industries.

The Role of Partnerships in Advancing the Blue Economy

Partnerships are fundamental to the successful development of the Blue Economy. Through projects like the Tuna Consortium, supported by the Walton Foundation, and USAID's Fish Right and Ber-IKAN initiatives in Southeast Asia, we have seen firsthand how collaboration can address capacity gaps and infrastructure challenges while centering the needs of local and Indigenous communities. These partnerships emphasize the importance of evidence-based solutions, governance strengthening, and resilience planning to support the long-term health of ocean ecosystems.

A recent example of partnership-driven progress is the launch of the CIRCLE Alliance: Catalyzing Inclusive, Resilient, Circular Local Economies. This \$21 million initiative, a collaboration between Unilever, USAID, and EY, aims to reduce plastic pollution and promote sustainable solutions among small and medium-sized businesses. This initiative exemplifies how partnerships can drive both environmental and economic outcomes by leveraging the strengths of different sectors.

As Resonance's co-founder Steve Schmida points out in his book, *Partner with a Purpose*, creating impactful partnerships requires a deep understanding of the roles and interests of all stakeholders.



By designing partnerships that align the goals of the private sector with those of local communities and ecosystems, the Blue Economy can achieve sustainable growth and address the most pressing challenges facing our oceans today.

In conclusion, the Blue Economy presents both immense opportunities and significant challenges. By fostering inclusive, sustainable growth across its diverse sectors, and by building partnerships that support innovation and ecological stewardship, we can ensure that the Blue Economy contributes to a healthier, more resilient planet for generations to come.

Overview of Activity 1.1

Activity 1.1 focuses on developing a comprehensive understanding of the Blue Economy within the Black Sea Basin region. This activity plays a foundational role in shaping sustainable practices and fostering collaboration across key sectors and stakeholders. It is structured into two critical stages: Baseline Assessment and Stakeholder Mapping, each designed to gather essential insights and build a cohesive framework for transnational cooperation.

Stage 1: Baseline Assessment

The Baseline Assessment provides an in-depth examination of the current state of the Blue Economy. It evaluates core sectors, such as fisheries, aquaculture, marine energy, maritime transport, and coastal tourism, analyzing their scope, scale, and practices. This stage also assesses the extent of technological adoption and highlights successful case studies while identifying opportunities for innovation and efficiency. Additionally, it examines sustainability practices within the region, focusing on environmental and social dimensions, and uncovers gaps that could be addressed to enhance the sector's overall performance.

Deliverables from this stage include a detailed report that captures the Blue Economy's present dynamics, opportunities for technological integration, and recommendations for advancing sustainable practices.

Stage 2: Stakeholder Mapping

Stakeholder Mapping is integral to ensuring that the region's Blue Economy is inclusive and collaborative. This stage involves identifying key stakeholders, including enterprises, research institutions, youth organizations, regional authorities, and industry associations. By analyzing their roles, interests, and influence, this stage provides a clear understanding of stakeholder dynamics and interconnections. It also explores their specific needs and priorities, ensuring that engagement strategies are tailored to foster meaningful participation and collaboration.

The outcome of this stage is a comprehensive map of stakeholders and a strategic report outlining engagement frameworks to support the development of a sustainable transnational network.

Purpose and Goals

The overarching goal of Activity 1.1 is to create a solid foundation for regional cooperation by integrating insights from both stages. The findings will inform future project activities, ensuring that interventions are relevant, impactful, and aligned with global sustainability objectives. By promoting cross-border partnerships and sectoral innovation, the activity aims to position the Black Sea Basin as a leader in the sustainable management of ocean resources, contributing to broader global initiatives such as the UN's Sustainable Development Goals, particularly Goal 14: Life Below Water.

Activity 1.1 is a crucial step toward fostering a resilient and thriving Blue Economy in the Black Sea Basin, paving the way for inclusive growth and environmental stewardship.

Objectives of Activity 1.1

The primary aim of Activity 1.1 is to establish a robust foundation for understanding and advancing the Blue Economy within the Black Sea Basin region. By conducting a comprehensive analysis of the sector and engaging key stakeholders, this activity seeks to promote sustainable practices, foster collaboration, and guide future policy development.

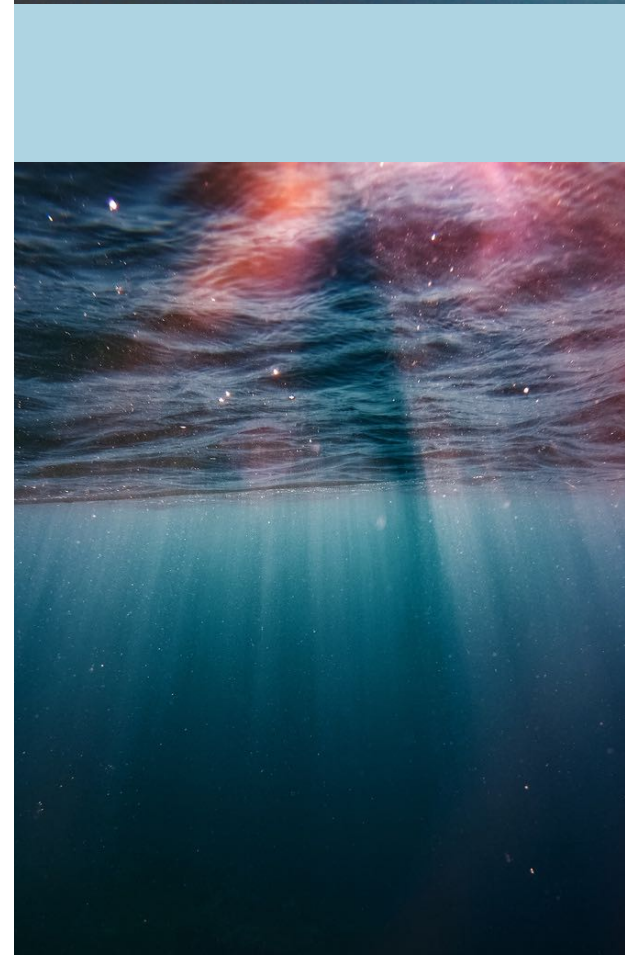
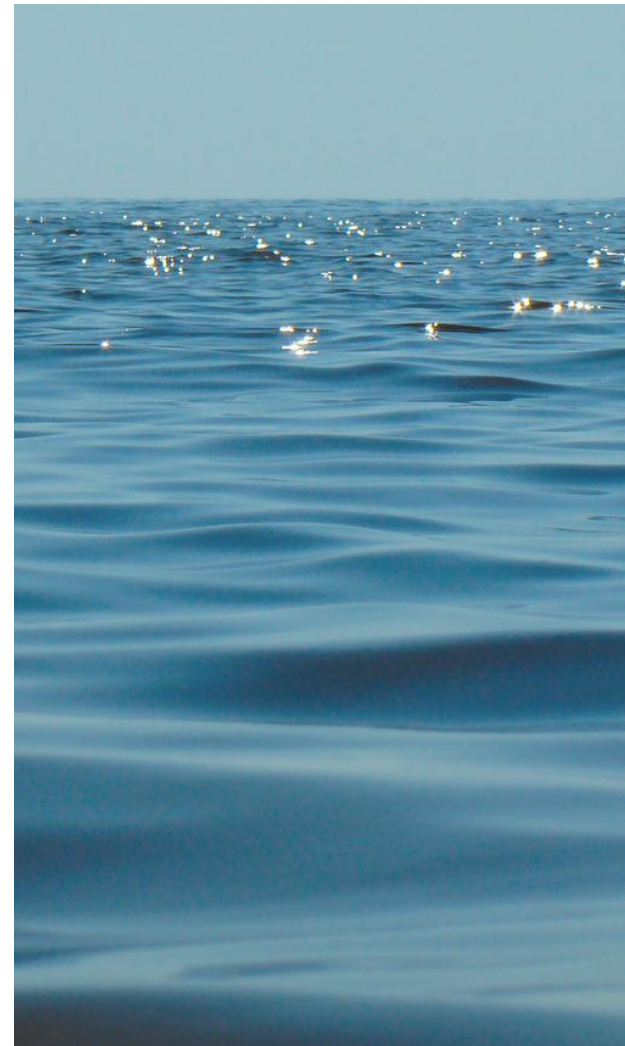
One of the key objectives of this activity is to assess the current state of the Blue Economy in the region. This involves a detailed examination of core sectors such as fisheries, aquaculture, marine energy, maritime transport, and coastal tourism. The goal is to understand the scope, scale, and operational practices of these sectors while analyzing their economic, environmental, and social dimensions. This analysis will provide insights into the region's strengths and challenges, serving as a baseline for future interventions.

Another crucial objective is to evaluate the extent of technological integration and innovation within the Blue Economy. By identifying successful case studies and areas where technology can drive efficiency and sustainability, the activity aims to uncover opportunities for growth and modernization. Technological advancements can play a pivotal role in enhancing sectoral productivity while minimizing environmental impact, making this an essential focus area.

Sustainability practices within the Blue Economy are also a central concern. Activity 1.1 seeks to investigate how businesses and stakeholders incorporate environmental and social sustainability into their operations. This involves identifying challenges to adopting sustainable practices and exploring opportunities to strengthen environmental stewardship and social responsibility across sectors.

In addition to assessing current practices, the activity aims to identify gaps and areas for improvement within the Blue Economy. These gaps could relate to policy, technology, or operational inefficiencies. By addressing these shortcomings, the activity seeks to unlock the sector's full potential while ensuring alignment with long-term sustainability goals.

Stakeholder engagement is another cornerstone of Activity 1.1. A significant objective is to identify and map key stakeholders across various sectors, including enterprises, youth organizations, research institutions, regional authorities, and industry associations. Understanding their roles, influence, and interconnections will provide a clear picture of the sector's dynamics and help foster meaningful collaboration. Moreover, the activity seeks to understand stakeholders' specific needs, expectations, and priorities, enabling the development of tailored strategies that address their unique concerns.



To support effective collaboration, the activity will formulate strategies for stakeholder engagement and participation. These strategies will focus on creating inclusive and adaptive frameworks that facilitate cross-border cooperation and align with the overarching goals of sustainability and regional development.

Finally, Activity 1.1 aims to generate insights that will inform future initiatives and policy-making efforts. The findings from this activity will serve as a foundation for subsequent stages of the project, guiding targeted interventions and fostering alignment with global sustainability initiatives, such as the United Nations Sustainable Development Goals (SDGs), particularly Goal 14: Life Below Water.

Through these objectives, Activity 1.1 seeks to position the Black Sea Basin region as a leader in sustainable Blue Economy development. By fostering innovation, collaboration, and sustainability, the activity aims to build a resilient and thriving economic framework that benefits both current and future generations.

Methodology of Activity 1.1

The methodology for Activity 1.1 adopts a structured and systematic approach to analyze the Blue Economy within the Black Sea Basin region. It is designed to gather comprehensive insights and foster collaboration among stakeholders to support sustainable development. The activity is divided into two distinct but interconnected stages: Baseline Assessment and Stakeholder Mapping. Each stage employs specific techniques and tools to achieve the overarching objectives effectively.

Stage 1: Baseline Assessment

The first stage, Baseline Assessment, focuses on understanding the current state of the Blue Economy in the Black Sea Basin by analyzing its key sectors, technological adoption, and sustainability practices. The process begins with a sectoral analysis, which examines core areas such as fisheries, aquaculture, marine energy, maritime transport, and coastal tourism. This involves gathering data on the scope, scale, and practices of these sectors through extensive literature reviews, analysis of government and industry reports, and statistical data collection. The aim is to provide a clear picture of how these sectors contribute to the region's economy and identify their existing strengths and challenges.

In parallel, an evaluation of technological integration is conducted to assess the extent to which innovative solutions are employed within the Blue Economy. This includes identifying successful case studies where technology has enhanced efficiency and sustainability and highlighting areas where technological advancements could drive further improvements.

The methodology also incorporates an examination of sustainability practices. This step focuses on understanding how environmental and social sustainability is integrated into sectoral activities. It involves interviews and surveys with businesses and organizations to explore their approaches to sustainability, the challenges they face, and the opportunities for improvement.

Finally, the Baseline Assessment identifies gaps and opportunities within the Blue Economy. This comprehensive analysis considers economic, environmental, and social dimensions to uncover areas where interventions could drive significant progress. The findings are synthesized into a detailed report, providing a foundation for the subsequent stages of the activity.

Stage 2: Stakeholder Mapping

The second stage, Stakeholder Mapping, focuses on identifying and analyzing the key actors involved in the Blue Economy within the Black Sea Basin. This stage ensures that stakeholders' needs, roles, and priorities are effectively understood and integrated into the activity's outcomes.

The process begins with the identification of stakeholders across various groups, including enterprises, youth organizations, regional authorities, research institutions, and industry associations. This is achieved through desk research, stakeholder directories, and consultations with regional experts.

Once identified, stakeholders are analyzed through mapping their roles, influence, and interconnections. This involves categorizing stakeholders based on their level of engagement and influence within the Blue Economy. The analysis also highlights their relationships with other actors, providing insights into the sector's dynamics and potential collaboration pathways.

The methodology further involves understanding stakeholders' specific needs and priorities. Surveys, interviews, and focus group discussions are employed to capture their expectations and challenges. This tailored approach ensures that stakeholder engagement strategies address the unique concerns of each group.

Based on this analysis, the activity develops strategies for effective stakeholder engagement, emphasizing inclusivity and meaningful participation. These strategies outline frameworks for collaboration, ensuring that all stakeholders are actively involved in shaping a sustainable transnational network. The results of this stage are documented in a comprehensive stakeholder map and accompanying report.

Integrated Approach and Tools

Throughout both stages, the methodology leverages a combination of qualitative and quantitative methods. Desk research, field surveys, case studies, and stakeholder consultations are complemented by statistical analysis and visualization tools to ensure robust and actionable insights. The activity also incorporates feedback loops, allowing for iterative refinement of findings and strategies based on stakeholder input.

Conclusion

The methodology of Activity 1.1 is designed to provide a holistic understanding of the Blue Economy in the Black Sea Basin while fostering collaboration among key stakeholders. By combining in-depth sectoral analysis with strategic stakeholder mapping, this approach ensures that the activity's outcomes are both comprehensive and actionable. These findings will serve as a critical foundation for building a sustainable and inclusive transnational network, guiding the region's efforts toward long-term economic and environmental resilience.



PREAMBLE

The Black Sea Basin is a region of immense ecological, economic, and cultural significance. Its marine and coastal resources form the backbone of the Blue Economy, encompassing vital sectors such as fisheries, aquaculture, maritime transport, marine energy, and coastal tourism. However, the region faces challenges related to sustainability, technological gaps, and limited collaboration among stakeholders, which hinder the full realization of its economic potential.

Activity 1.1 represents a pivotal step toward addressing these challenges by fostering a deeper understanding of the Blue Economy in the Black Sea Basin and promoting cross-border collaboration. It aims to create a solid foundation for sustainable practices and inclusive growth by combining comprehensive sectoral analysis with strategic stakeholder engagement. This activity aligns with global initiatives, particularly the United Nations Sustainable Development Goals, and aspires to position the Black Sea Basin as a model for sustainable and innovative ocean resource management.

The outcomes of Activity 1.1 will not only inform future project activities but also contribute to a shared vision of a resilient and prosperous Blue Economy that benefits all stakeholders in the region.

PREFACE

The ocean, with its vast resources and untapped potential, has emerged as a cornerstone for global economic development under the banner of the Blue Economy. For the Black Sea Basin, this concept is more than an economic opportunity—it is a necessity for ensuring the long-term sustainability of its marine ecosystems and the livelihoods of its coastal communities.

Activity 1.1 is an ambitious initiative that seeks to catalyze sustainable development in the region by addressing critical gaps and fostering collaboration among diverse stakeholders. This activity combines rigorous research with inclusive dialogue to produce actionable insights and strategies. The Baseline Assessment stage delves into the current state of the Blue Economy, uncovering challenges and opportunities, while the Stakeholder Mapping stage ensures that every voice—from enterprises to youth organizations—is included in shaping a sustainable transnational network.

This document outlines the methodology, objectives, and scope of Activity 1.1, offering a roadmap for strengthening the Blue Economy in the Black Sea Basin. It reflects our shared commitment to preserving the health of our oceans while harnessing their potential for economic growth and social well-being.

We express our gratitude to all the contributors and stakeholders who have participated in this initiative. Their collaboration and insights are invaluable in achieving the shared vision of a thriving, inclusive, and sustainable Blue Economy for the Black Sea Basin and beyond.

2. STAGE 1: BASELINE ASSESSMENT



The Role of Cities and Regions in Building a Sustainable Blue Economy

The blue economy is a significant driver of urban and regional development, creating millions of jobs in water-dependent sectors such as fisheries, tourism, and shipping. It contributes to economic growth and social wellbeing by leveraging the vast resources of freshwater, coastal, and marine ecosystems. However, this economic potential comes with challenges, including environmental degradation, carbon emissions, and the vulnerability of water ecosystems to climate change impacts. Cities and regions, as the primary arenas of blue economy activities, play a pivotal role in creating resilient and sustainable approaches that balance economic benefits with ecosystem preservation. Building on a global survey of over 80 cities, regions, and basins, this report examines the costs and benefits of the blue economy at the subnational level and highlights its links with water security.

The blue economy encompasses not only ocean-based industries but also freshwater-related sectors and ecosystems. This broad scope recognizes the interconnectedness of freshwater and seawater through the global water cycle and the necessity of integrating water security into blue economy strategies. Subnational governments hold critical responsibilities in urban planning, water management, waste disposal, and climate resilience, all of which shape the sustainability of blue economy sectors. Land use practices, for example, can significantly impact ecosystems such as mangroves, wetlands, and coral reefs, which provide essential services like flood mitigation and carbon sequestration. Local authorities also influence regional economic development, tourism, and innovation, which directly affect the productivity and sustainability of blue economy sectors.

The blue economy presents substantial opportunities for territorial development, as evidenced by survey findings. The most prevalent blue economy sectors in cities and regions are seafood production (90%), water-related tourism (86%), and water passenger transport (70%). Job creation and economic growth are primary drivers, with examples such as Barcelona, where the blue economy contributes 4.3% of GDP, and California, where one in nine jobs is linked to port-related activities. Biodiversity conservation also emerged as a significant motivator, with 81% of respondents emphasizing its importance. Ecosystems like mangroves, coral reefs, and coastal wetlands provide vital non-market benefits, from flood protection to supporting marine biodiversity, underscoring the necessity of safeguarding these natural assets.

Despite its potential, the blue economy poses environmental risks, including waste generation and water pollution. Resource-intensive activities, such as tourism and coastal development, contribute to plastic pollution and habitat degradation, while climate-related threats, including sea level rise, floods, and coastal erosion, jeopardize both ecosystems and infrastructure. For instance, ghost fishing gear accounts for 10% of oceanic plastic pollution, and extreme water scarcity events could cost cities up to 12 percentage points in GDP growth by 2050. Addressing these challenges requires coordinated efforts across governance levels to mitigate environmental impacts and adapt to climate risks.

Subnational governments have begun to develop tools and strategies for fostering sustainable blue economies, but significant governance gaps remain. Only a small fraction of survey respondents (7 out of 81) have formal blue economy strategies, and many face barriers such as insufficient financial resources and inadequate data-sharing mechanisms. Aligning national and subnational policies is crucial, as discrepancies in priorities and sectoral focuses often hinder effective implementation. A territorial approach that tailors policies to local needs and ensures multi-level governance coherence is essential for addressing these challenges.

To advance resilient, inclusive, sustainable, and circular (RISC-proof) blue economies, the report emphasizes three governance pillars: policy making, policy coherence, and policy implementation. Effective policy making requires clear roles, institutional capacity building, and robust data systems. Policy coherence demands alignment across government levels and sectors, addressing interconnected issues such as climate change, water security, and biodiversity conservation. Implementation relies on practical tools like financing mechanisms, regulatory frameworks, and innovation networks.



Examples of successful initiatives include Lisbon's Sea Hub, which connects businesses and researchers to foster innovation, and New Orleans' tailored education programs that align workforce skills with local blue economy needs.

The report concludes with a RISC Assessment Framework designed to help subnational governments evaluate their blue economies. This self-assessment tool facilitates a comprehensive diagnosis of resilience, inclusiveness, sustainability, and circularity, while providing a "whole-of-water" checklist to embed water security into blue economy strategies. By fostering multi-stakeholder dialogue and aligning efforts across governance levels, cities and regions can unlock the potential of the blue economy while ensuring its long-term viability and ecological integrity.

2.1 Key Sectors of the Blue Economy

The blue economy spans several critical sectors that harness the potential of water-based resources to drive economic growth, create jobs, and enhance community well-being. The following sections outline the key sectors of the blue economy:

2.1.1. Fisheries

Fisheries are one of the most prominent sectors within the blue economy, providing a vital source of protein and employment for millions of people globally. Wild-capture fisheries, which include both commercial and artisanal fishing, contribute significantly to the food security of coastal and inland populations. Beyond the direct provision of seafood, fisheries also support associated industries such as fish processing, distribution, and retail. However, overfishing, habitat degradation, and climate change pose significant challenges to the sustainability of fish stocks. Therefore, sustainable fisheries management is critical to ensuring long-term benefits for both local economies and marine ecosystems.

Enhancing the Fisheries Sector in the Blue Economy

Fisheries play a central role in the Blue Economy, providing essential food sources, supporting livelihoods, and contributing significantly to global economic activity. However, the sustainability of the seafood trade is increasingly at the forefront of discussions surrounding the health of our oceans. One of the most prominent issues in this debate is the sustainability of octopus fisheries, particularly in light of recent efforts to breed octopuses in captivity for commercialization. This debate gained additional visibility with the release of a documentary about a unique octopus, highlighting the delicate balance between exploiting ocean resources and ensuring their long-term survival.

As global demand for seafood rises, overexploitation of marine resources has become a pressing concern.



According to the Food and Agriculture Organization (FAO), one-third of fish stocks are overexploited, a trend that has worsened since the 1970s when the figure was just 10%. This overfishing threatens biodiversity and disrupts marine ecosystems, putting species at risk and endangering the livelihoods of millions who depend on fishing.

The shift towards sustainability in fisheries has become imperative, and this change is increasingly evident in the business practices of many nations, including Spain. A positive example of this shift is the rise in demand for seafood products certified by sustainability organizations like the Marine Stewardship Council (MSC). In Asturias, for instance, octopus caught by artisanal fisheries and certified with the MSC seal fetched prices 15-24.5% higher than non-certified products. This price premium demonstrates that consumers are willing to support sustainable practices, highlighting the financial incentives for adopting environmentally responsible methods.

The Global Importance of Fisheries

Fisheries are critical for global food security, with one in ten people worldwide depending on fishing for their livelihoods. This reliance is especially high in the southern hemisphere, where coastal communities often rely on fish as both a primary source of nutrition and income. However, increasing pressure from human activity, climate change, and illegal fishing threatens the stability of these ecosystems and the industries that depend on them.

The growing recognition of sustainability within the seafood sector has led to significant shifts in how businesses approach fishing practices. Many fishing companies now understand that the health of the oceans is directly linked to the long-term viability of their operations. The challenge is to ensure that sustainable practices become the norm, rather than the exception, across the entire seafood supply chain—from fishing operations to markets and consumers.

Towards Sustainable Fisheries: Challenges and Opportunities

To move towards sustainability, fishing companies must first assess and minimize the environmental impacts of their activities. This is a critical step in ensuring the health of fish stocks and the ecosystems they inhabit. As Laura Rodríguez, director of MSC in Spain and Portugal, notes, the next step involves the trading companies. These businesses must gain a clear understanding of the seafood supply chain, ensuring traceability and transparency regarding the origins of the products they sell.

Ports and fish auctions are also key players in ensuring the sustainability of fisheries. By verifying the origins of fish and shellfish during the first sale, these entities can help combat illegal fishing and ensure that only legally and sustainably harvested products enter the market. The role of consumers is equally crucial; by choosing sustainably sourced seafood and looking for certification seals such as the MSC label, consumers can directly contribute to the sustainability of the oceans.

A significant trend in the seafood industry is the growing recognition of the business benefits that come with sustainability certifications. Companies that adopt responsible practices not only help protect marine ecosystems but also gain access to better market prices, improve their public image, and strengthen their relationships with consumers. For example, research has shown that companies with MSC certification can achieve better stock market performance and access higher-value markets, as investors increasingly value sustainability efforts.

The Role of Innovation in Sustainable Fisheries

Innovation plays a vital role in advancing sustainability in the fisheries sector. Companies such as Frime, a tuna trading company, are at the forefront of this transformation. Frime utilizes sustainable fishing techniques and invests in research and development (R&D) to optimize its operations. The company also embraces technologies such as X-ray and artificial vision systems to improve product labeling accuracy and ensure traceability, which is essential for verifying the sustainability of seafood products.

These innovations, combined with a commitment to reducing waste, improving energy efficiency, and supporting the circular economy, help create a more sustainable fishing industry. The growing emphasis on sustainability is not only driven by environmental concerns but also by economic incentives, as demonstrated by the increasing demand for sustainably certified seafood products.

The Socio-Economic Benefits of Sustainable Fisheries

Sustainable fisheries offer a wide range of socio-economic benefits. For the fishing industry, sustainability certifications like those from MSC can provide higher market prices and greater bargaining power for local fishing communities.

For example, Asturian artisanal fisheries that sell MSC-certified octopus have seen a significant price premium, which directly benefits local fishermen and their communities. Moreover, these fisheries have gained more negotiating power and improved relationships with both government bodies and scientific institutions, further strengthening the resilience of the sector.

In addition to economic benefits, sustainable fisheries contribute to food security and help protect marine biodiversity, which is critical for the long-term health of ocean ecosystems.

As the Blue Economy continues to grow, sustainable fisheries will play a central role in ensuring that seafood remains a viable and nutritious food source for generations to come.

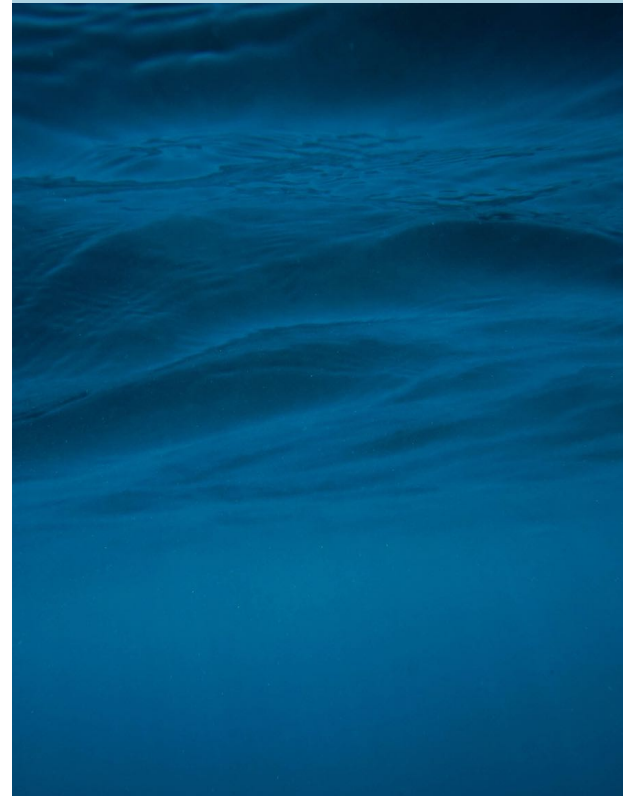
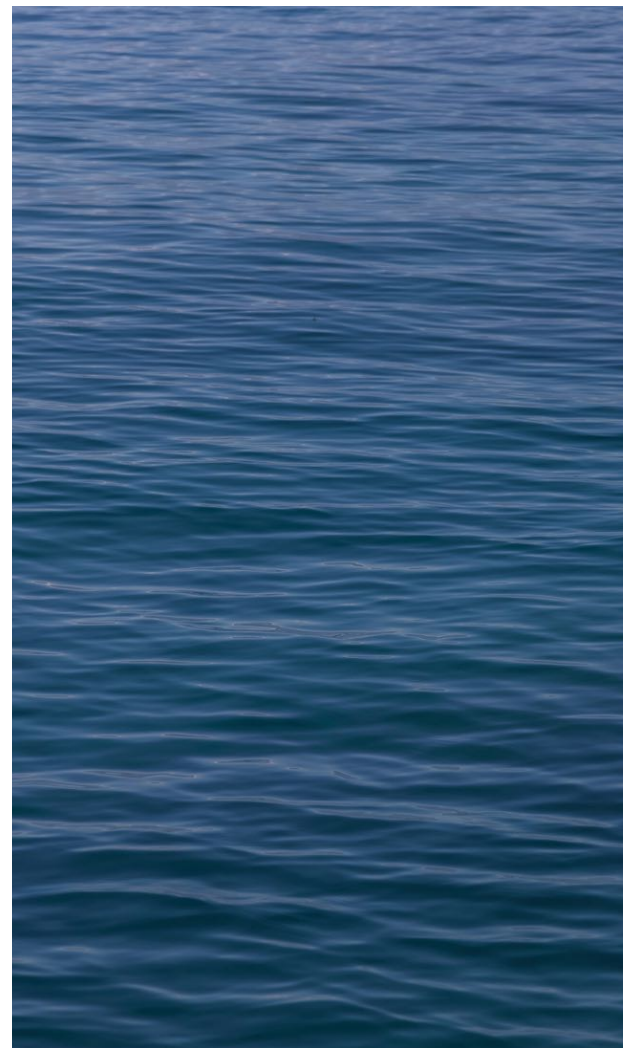
Conclusion: A Path to Sustainable Fisheries within the Blue Economy

The Blue Economy offers a path forward for industries like fisheries to grow while preserving marine ecosystems and ensuring long-term sustainability. As global demand for seafood continues to rise, it is essential that fishing practices evolve to meet the challenges of overexploitation, climate change, and environmental degradation.

The shift towards sustainability in fisheries is already underway, with key players in the seafood supply chain—from fishing companies to consumers—recognizing the importance of sustainable practices.

By investing in innovation, strengthening traceability systems, and embracing sustainability certifications, the fisheries sector can contribute to a healthier ocean and a more resilient global economy.

Through these efforts, the Blue Economy can provide food security, protect marine biodiversity, and create economic opportunities for millions of people who depend on the sea.



2.1.2. Aquaculture

Aquaculture, the farming of aquatic organisms such as fish, shellfish, and seaweed, is rapidly growing in importance as a key component of the blue economy. It provides an alternative to wild-capture fisheries, helping to alleviate pressures on natural stocks. With the global demand for seafood continuing to rise, aquaculture offers an opportunity to meet this demand in a sustainable way by adopting innovative technologies and practices. However, it also faces environmental challenges, including water pollution, habitat alteration, and disease management. As such, responsible aquaculture practices that ensure minimal environmental impact while supporting food security are essential for the sector's growth.

Aquaculture plays a pivotal role in meeting the growing global demand for fish and seafood, contributing significantly to food security, livelihoods, and economic growth worldwide. It is estimated that in 2014, global fish production reached 164 million tons, with aquaculture accounting for about 50% of food fish production, up from just 7% in 1970. This contribution is expected to increase to 65% by 2030, a vital source of animal protein and essential micronutrients for millions of people, particularly in developing regions like Asia and Africa. Aquaculture not only supports food security but also provides employment opportunities to over 58 million people worldwide, with another 200 million involved in the seafood value chain.

Despite its growth, the aquaculture sector faces significant challenges, especially in terms of environmental sustainability. Unsustainable practices, disease outbreaks, and weak governance have hindered its potential to grow in a manner that benefits both people and ecosystems. For instance, overexploitation of aquatic resources in marine capture fisheries has led to biodiversity loss and ecosystem degradation. Similarly, issues like illegal, unreported, and unregulated (IUU) fishing contribute to unsustainable pressures on aquatic habitats and fish stocks.

Recognizing the importance of sustainable growth in fisheries and aquaculture, the Food and Agriculture Organization (FAO) launched the Blue Growth Initiative (BGI) in 2013. This initiative aims to support the sustainable management of living aquatic resources while fostering economic growth, poverty alleviation, and social development. It emphasizes ecosystem-based approaches and encourages the integration of aquaculture into broader development strategies that promote both environmental sustainability and social inclusion.

The Blue Growth Initiative also promotes responsible intensification of aquaculture. This involves increasing aquaculture productivity through better management practices, technological advancements, and improved resource efficiency. Key efforts include developing sustainable feed technologies, improving biosecurity measures to prevent disease outbreaks, and implementing stricter regulatory frameworks for aquaculture management. This approach is crucial in regions like Southeast Asia and parts of Africa, where aquaculture is expanding rapidly but often lacks robust regulatory oversight.

A key strategy for sustainable aquaculture development is Public-Private Partnerships (PPPs). These partnerships foster collaboration between governments, the private sector, and local communities to promote responsible aquaculture practices and build capacity in developing countries. Regional research centers play an important role in disseminating best practices, while also encouraging South-South cooperation to address specific challenges in aquaculture governance and disease management.

In addition to expanding aquaculture production, another important aspect is addressing the challenges posed by climate change. Coastal and low-lying communities, where aquaculture is often concentrated, are particularly vulnerable to climate-induced disruptions such as rising sea levels, storms, and changes in fish distribution patterns.

Aquaculture can be part of the solution by providing sustainable food sources in the face of these challenges, but only if it is managed in a way that minimizes environmental impacts and supports the resilience of coastal communities.

food and income but also an essential component of a broader, sustainable economic system. To ensure that the sector can continue to meet future demands without compromising marine ecosystems, the transition towards responsible aquaculture must be prioritized. This means embracing innovation, strengthening governance, and fostering collaborations that prioritize the long-term health of aquatic ecosystems alongside economic growth. Through such efforts, aquaculture can continue to grow as a sustainable and vital source of global food security, economic development, and resilience in the face of climate change.

2.1.3. Marine Energy

Marine energy, including both offshore wind and tidal energy, has emerged as a promising sector for the blue economy, contributing to global efforts to transition to renewable energy sources. Marine energy has significant potential to generate electricity from the sea, utilizing its currents, waves, and tides, as well as harnessing wind power through offshore turbines. This sector plays a pivotal role in addressing climate change by providing clean, sustainable energy while reducing reliance on fossil fuels. However, the development of marine energy infrastructure must account for environmental considerations and potential impacts on marine ecosystems and local communities.

Marine energy holds immense potential as a clean, renewable energy source that could play a significant role in the United States' transition to 100% clean electricity by 2035 and achieving net-zero emissions by 2050. Marine energy leverages the natural movement of water—waves, tides, currents, and temperature differences—to generate power. This energy source offers a variety of benefits that not only address the growing demand for clean energy but also support the development of resilient, sustainable energy infrastructure, particularly for communities that are traditionally underserved by conventional power grids.

Benefits of Marine Energy

One of the primary advantages of marine energy is that it is a renewable and clean energy source. Unlike fossil fuels, which release harmful emissions into the atmosphere, marine energy harnesses the natural movement of water to produce electricity, without generating air pollution or greenhouse gases. This makes it an attractive solution to combat climate change and reduce the environmental impact of traditional energy sources.

In addition to being clean, marine energy is also abundant and accessible. The United States has an extensive coastline and many river systems, creating vast opportunities to harness energy from waves, tides, and currents. With nearly 60% of the nation's total electricity needs potentially met through marine energy resources, tapping into these abundant sources can help diversify the energy mix and reduce dependency on external energy imports. This large resource base provides significant potential for generating renewable energy and meeting the nation's future energy demands.

Another key benefit of marine energy is its predictability. Unlike other renewable energy sources such as solar and wind, which can be intermittent, marine energy is highly reliable because it depends on the cyclical nature of tides and currents. These patterns are regular and consistent, occurring daily and seasonally, which makes it easier to forecast and plan for energy generation. The predictability of marine energy allows it to complement other renewable sources like solar and wind, whose electricity generation can fluctuate, especially during periods of calm or cloudy days.

Furthermore, marine energy is a resilient energy source. Many marine energy technologies can be deployed near the coastlines where power is needed, reducing the need for long transmission lines that can be costly and vulnerable to disruptions.

By being situated closer to demand areas, these technologies enhance the reliability and resilience of the energy grid, particularly in times of emergencies or climate-related events. This localized energy generation also strengthens the overall stability of the grid, making it more capable of withstanding unforeseen disruptions.

Marine energy also provides a unique opportunity to power remote and island communities. Many of these communities, which are often located in coastal or isolated areas, face challenges in accessing reliable energy. Marine energy can help overcome this obstacle by powering microgrids that draw on the surrounding ocean or river water. This provides an efficient, locally sourced, and renewable energy solution that reduces reliance on costly fossil fuels and improves energy security for these vulnerable communities.

In addition to its role in powering homes and businesses, marine energy also opens doors to other innovations in the blue economy. For instance, marine energy can be used to power desalination plants that provide clean drinking water or support ocean monitoring technologies that enhance our understanding of marine ecosystems. These applications contribute to the broader goals of sustainability, improving water availability, and advancing the understanding and protection of the oceans.

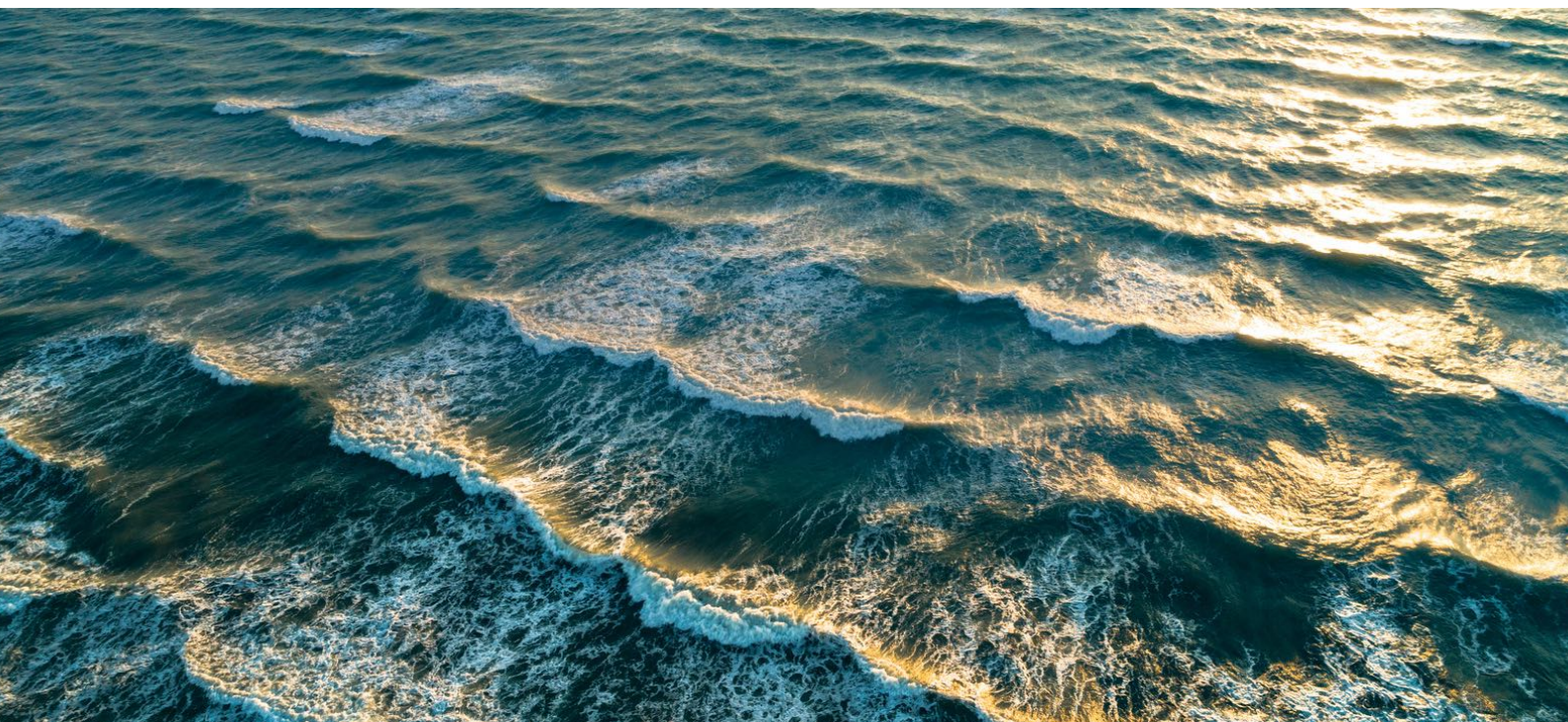
Another significant advantage of marine energy is its potential to create jobs and stimulate economic growth. As the development of marine energy technologies grows, local communities will see the creation of new employment opportunities in areas such as research, engineering, operations, and maintenance. These jobs will be especially important in coastal regions and islands, where marine energy systems are likely to be deployed. This can foster economic development in regions that may otherwise struggle with high unemployment rates, especially in remote areas.

Addressing Challenges in Marine Energy Development

While marine energy offers a promising path toward a sustainable energy future, several challenges need to be addressed to fully realize its potential. High costs, complex permitting processes, and the technical challenges associated with deploying and maintaining systems in harsh marine environments are significant barriers to widespread adoption. However, organizations like the Water Power Technologies Office's Marine Energy Program are working to overcome these hurdles through targeted research and development (R&D) efforts.

The program's R&D efforts focus on four key areas to improve the viability of marine energy technologies:

1. Foundational Research and Development (R&D):
2. To support innovation, foundational R&D is crucial to improving our understanding of marine energy technologies and their potential for efficient power generation.
3. Technology-Specific System Design and Validation:
4. Marine energy systems need to be designed to withstand harsh ocean conditions. This area of R&D aims to develop technologies that are not only efficient but also durable, ensuring long-term operation without frequent maintenance or failure.
5. Reducing Barriers to Testing:
6. One of the most significant challenges facing marine energy technologies is the cost and complexity associated with in-water testing. The program works to reduce these barriers by streamlining the permitting process and providing support to facilitate testing and demonstration of new technologies in real-world marine environments.
7. Data Access and Analytics:
8. Accurate data is essential for optimizing the performance of marine energy systems. The program focuses on improving data accessibility and developing analytical tools that help stakeholders make informed decisions about technology deployment and system performance.



The Future of Marine Energy

Looking ahead, marine energy holds tremendous potential to transform the U.S. energy landscape. Its ability to generate clean, reliable power from renewable sources offers a sustainable solution to address the nation's growing energy needs while reducing greenhouse gas emissions. Moreover, the development of marine energy technologies can create new economic opportunities and strengthen the resilience of local communities, particularly those in coastal and island regions.

As marine energy continues to evolve, ongoing investments in research, technology development, and public-private partnerships will be critical to unlocking its full potential. With continued support and innovation, marine energy could become an integral part of the United States' clean energy future, helping to build a more sustainable, resilient, and economically vibrant society. Through collaboration and strategic action, marine energy can play a pivotal role in the transition to a clean energy economy.

2.1.4. Maritime Transport

Maritime transport is a vital component of global trade and the broader blue economy, encompassing a wide range of sub-sectors, including passenger transport, freight transport, and services for transport. This sector is integral to the global economy, moving billions of tons of goods across seas and oceans annually. The importance of maritime transport cannot be overstated, given that approximately 12 billion tons of traded goods were transported by sea in 2022, accounting for nearly 49% of global trade—almost twice the proportion transported by air. This highlights the central role of maritime transport in the global supply chain, enabling the exchange of goods and connecting countries and regions.

Maritime transport is a cornerstone of global trade and an essential component of the blue economy. It involves the transportation of goods and people by sea, supporting industries such as shipping, port operations, and logistics. The sector is responsible for a significant share of global trade, with 80-90% of goods transported by sea. Maritime transport enables the efficient movement of goods across vast distances, contributing to economic growth, job creation, and international trade. However, the sector faces challenges such as carbon emissions, pollution, and the need for enhanced infrastructure and safety standards. As part of the transition to a sustainable blue economy, maritime transport must adopt greener technologies and practices to minimize its environmental footprint.

Sub-Sectors of Maritime Transport

The maritime transport sector is composed of several key sub-sectors:

1. **Passenger Transport:** This includes sea and coastal passenger water transport, as well as inland passenger water transport. Passenger services are crucial for tourism, trade, and daily travel, particularly in coastal regions and islands. In Europe, the sector has seen a significant recovery post-COVID-19, with 348.6 million passengers recorded in 2022. Despite a decline from pre-pandemic levels, countries like Greece, Italy, and Denmark remain major players in passenger transport.
2. **Freight Transport:** This sub-sector is responsible for the sea and coastal freight water transport, as well as inland freight water transport. Freight transport plays an essential role in the movement of goods like containers, bulk commodities (e.g., grain, coal, and oil), and roll-on/roll-off (Ro-Ro) vehicles. In 2021, short sea shipping (SSS) in the EU, which involves the transport of goods between European ports and those on the Mediterranean and Black Seas, accounted for 60.9% of the total sea transport of goods to and from EU ports. Liquid bulk cargo dominated this trade, followed by dry bulk and containers. Major maritime nations like Italy, the Netherlands, and Spain account for a significant portion of the EU's short sea shipping.
3. **Services for Transport:** This sub-sector includes the renting and leasing of water transport equipment, which supports the overall infrastructure of the maritime industry. It plays a crucial role in ensuring that the right vessels and equipment are available for transporting goods and passengers, both domestically and internationally.

Key Maritime Transport Players and Trends

Asia remains the dominant player in the maritime transport sector, loading and unloading 4.6 billion tons and 7 billion tons of goods, respectively, in 2022. Europe follows, with 1.6 and 1.7 billion tons of goods handled. While Europe's maritime connectivity, as measured by the Liner Shipping Connectivity Index (LSCI), saw a decline in 2022, it recovered in the second quarter of 2023. The most connected European economies in terms of LSCI were Spain, the Netherlands, and Belgium, with the leading ports being Rotterdam (Netherlands), Antwerp (Belgium), and Hamburg (Germany).

The maritime transport sector also contributes significantly to employment and economic output. In 2021, the sector generated a Gross Value Added (GVA) of €44.3 billion, a 42% increase compared to 2020. This growth is partly attributed to the recovery from the COVID-19 pandemic and increased global demand for goods.



The maritime transport sector employed nearly 380,000 people across Europe in 2021, with Germany, Italy, and France leading in employment figures. Within the sector, freight transport generates the largest share of GVA, followed by services for transport and passenger transport.

The Role of Maritime Transport in Global Trade

Maritime transport is the backbone of global trade, with key routes facilitating the movement of goods between continents. Liquid bulk carriers, such as those transporting oil, are some of the most common vessels used in global trade. However, container ships and dry bulk carriers (for products like grain and coal) also play significant roles in the global supply chain. In 2022, Europe's maritime sector handled 348.6 million passengers, a reflection of the robust demand for seaborne travel, especially in countries with strong coastal tourism industries.

Maritime transport's economic impact extends beyond the direct employment and GVA generated. Ports, shipbuilding, logistics services, and associated infrastructure contribute to the broader economy, making this sector a key driver of economic growth. With short sea shipping becoming increasingly vital, particularly within the EU, there is a growing emphasis on improving port efficiency and enhancing the connectivity of maritime routes.

Challenges and Sustainability

Despite its importance, the maritime transport sector faces numerous challenges that must be addressed for it to continue thriving in the future. One significant factor is the sector's ongoing energy transition, as it is under pressure to reduce its carbon footprint in response to stricter environmental regulations. The shift towards more sustainable energy sources, such as cleaner fuels and electrification, is essential to ensure that the sector remains viable and contributes to global efforts to combat climate change.

In addition to energy transition challenges, the sector must navigate geopolitical disruptions, such as wars and tensions that can affect key maritime trade routes, and technological advancements, such as digitalization and automation, which are reshaping how ships are operated and cargo is managed. Moreover, financial factors, such as insurance costs and the global economic climate, can impact shipping prices and the profitability of companies within the sector.

The Blue Economy and Maritime Transport

The blue economy encompasses all economic activities related to the oceans and seas, with a focus on sustainable growth while preserving marine ecosystems. Maritime transport is a central pillar of the blue economy, with its role in facilitating international trade and providing livelihoods for millions of people worldwide. The development of green shipping technologies, such as low-emission vessels and alternative fuels, is critical for the long-term sustainability of maritime transport.



Efforts to protect the oceans and reduce the environmental impact of maritime transport align with the philosophy of the blue economy, which emphasizes balancing economic growth with ecological preservation. The integration of sustainable practices within maritime transport—such as eco-friendly ship designs, cleaner energy sources, and efficient port operations—will help ensure that the sector can thrive while minimizing harm to the marine environment.

Conclusion

Maritime transport is an indispensable sector that underpins global trade, drives economic growth, and is deeply intertwined with the blue economy. As the sector continues to recover from the COVID-19 pandemic and faces new challenges related to sustainability, digitalization, and geopolitical instability, the need for innovation and adaptation is critical. The transition to greener, more sustainable practices in maritime transport will not only benefit the sector but also contribute to global efforts to protect the oceans and combat climate change. By investing in both infrastructure and technology, the maritime transport sector can continue to play a central role in the global economy, ensuring that it remains resilient, efficient, and environmentally responsible in the years to come.

2.1.5. Coastal Tourism

Coastal tourism is a major economic driver for many regions, generating significant revenue from activities such as beach holidays, water sports, and eco-tourism. As coastal areas often have unique natural and cultural attractions, tourism in these regions can create substantial employment opportunities and support local economies. However, the growth of coastal tourism can also bring about environmental pressures, such as coastal erosion, waste generation, and habitat destruction. To ensure the sustainability of coastal tourism, it is vital to implement sustainable tourism practices that protect coastal ecosystems while benefiting local communities and economies. This includes managing visitor numbers, reducing pollution, and supporting eco-friendly businesses.

Coastal and maritime tourism is the largest sector of the EU Blue Economy, both in terms of Gross Value Added (GVA) and employment. The European Union's coastal regions are popular destinations for millions of tourists each year, drawing both European and international travelers. Over half of the EU's bed capacity is situated in coastal areas, highlighting the critical role this sector plays in the region's tourism landscape. Coastal tourism is especially important for non-landlocked EU countries, particularly in Southern Europe, where it represents a substantial portion of national revenue. This sector encompasses a wide range of activities, from beach vacations and coastal walks to nautical sports and wildlife watching, making it a significant contributor to the local and regional economies.

Key Activities and Economic Contributions

Coastal tourism includes several key types of activities that attract millions of tourists to EU coastal regions. These activities are generally categorized into three main typologies:

1. **Accommodation:** This refers to the nights spent by tourists in various accommodation establishments located in coastal areas, such as hotels, resorts, and private rentals. Accommodation is the most significant component of coastal tourism, generating the highest number of jobs and contributing significantly to the sector's GVA.
2. **Transport:** Coastal tourism also involves various forms of sea-borne, road, rail, and air passenger travel. Given the region's expansive coastline and numerous islands, maritime transport is essential for connecting tourists to their destinations, particularly for island-hopping and visiting remote coastal towns.
3. **Other Expenditures:** Tourists typically spend money on a range of activities and goods while on vacation. These include food and beverage services, cultural and recreational activities, shopping, and purchases related to water sports, such as diving equipment or sailing gear.

These activities not only provide a direct economic benefit but also support broader industries such as hospitality, transport, and retail, further amplifying the importance of coastal tourism to the economy.

Economic Impact and Trends

Coastal tourism was significantly impacted by the COVID-19 pandemic, with the sector experiencing a sharp decline in 2020. However, it showed signs of recovery in 2021, though it still did not return to pre-crisis levels. In 2021, the sector generated a GVA of €49.9 billion, a 74% increase compared to the previous year, but still 38% lower than the GVA recorded in 2019. Gross profits in 2021 reached €16.1 billion, marking a fourfold increase over 2020. However, the sector's turnover, which includes accommodation, transport, and other services, amounted to €140.0 billion, reflecting a strong rebound despite the ongoing challenges posed by the pandemic.

The recovery trend was most prominent in Mediterranean countries, with destinations like Spain, Greece, and Italy seeing the highest levels of tourism activity. In terms of employment, Spain was the leader, accounting for 22% of jobs in coastal tourism, followed by Greece (19%), France (13%), and Italy (9%). The accommodation sector was the largest employer, followed by other services like restaurants and recreational activities.

Seasonality and Geographical Distribution

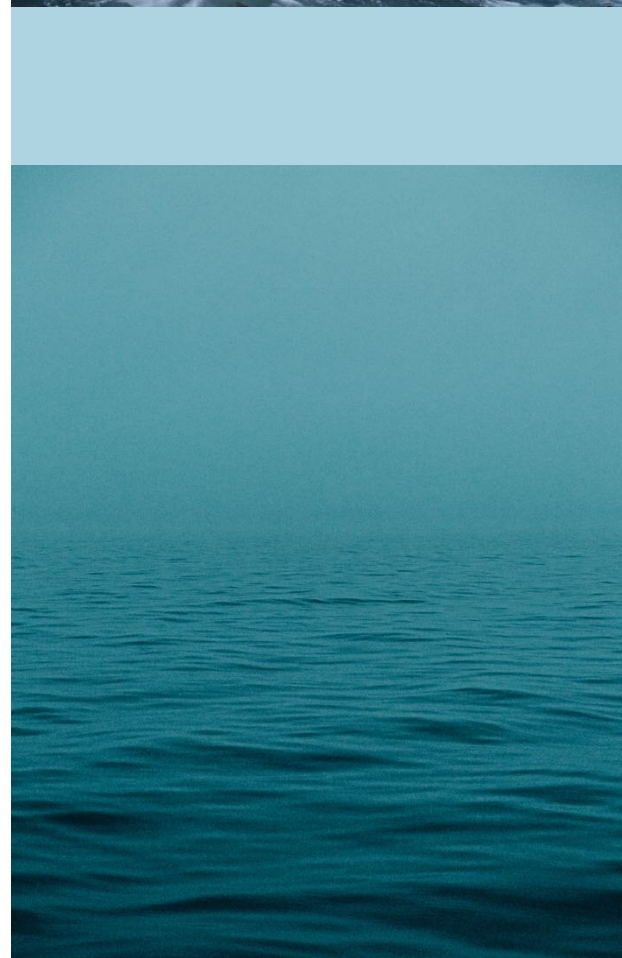
One of the defining characteristics of coastal tourism is its seasonality. Most coastal tourism demand is concentrated in the summer months, particularly July and August, which can create challenges related to overcrowding, infrastructure strain, and environmental impact. Despite this, the appeal of coastal areas remains strong, with many tourists seeking sun, sand, and sea, as well as the opportunity to engage in nautical sports such as sailing, scuba diving, and yachting.

Southern European countries, in particular, rely heavily on the influx of summer tourists, and their economies are often significantly impacted by the performance of the coastal tourism sector.

Countries with popular coastal destinations are highly dependent on this sector for job creation, foreign exchange earnings, and regional development. Beyond the summer months, tourism activity generally slows, placing pressure on local businesses to sustain income during the off-peak season.

The Role of Cruise Tourism

Cruise tourism is another significant driver of coastal tourism, particularly in Europe. The European Union is home to around sixty ports suitable for cruise ships, making it the second-largest market globally after the Americas. Before the pandemic, the cruise sector contributed 1.2 million jobs and \$150 billion to the global economy, underscoring its importance to the coastal tourism industry.



Cruise tourism has a profound impact on local economies, particularly in port cities, where it helps drive job creation, infrastructure development, and increased demand for local services such as transportation, restaurants, and entertainment. However, cruise tourism has also faced criticism for its environmental impacts, particularly regarding pollution and its carbon footprint. The challenge moving forward is balancing the economic benefits of cruise tourism with the need for sustainable practices to mitigate its environmental effects.

Opportunities for Youth and the Blue Economy

The EU has recognized the importance of engaging young people in the sustainable development of the coastal tourism sector and other aspects of the blue economy. Programs like the Blue Generation Project, which aims to inspire young people to pursue careers in marine and coastal industries, are helping to create a new generation of professionals equipped with the necessary skills for the blue economy. The project highlights opportunities in coastal tourism, aquaculture, marine biotechnology, and more, as well as the importance of ocean literacy and conservation.

Training young people with the right skills is crucial for ensuring that the sector remains sustainable and continues to grow. The European Year of Skills and initiatives like the EU4Ocean Coalition emphasize the need for developing blue skills to support the growth of the blue economy, including coastal tourism. These efforts are crucial for maintaining the balance between economic activity and the long-term health of marine and coastal environments.

The Future of Coastal Tourism

The future of coastal tourism will be shaped by several factors, including the recovery from the COVID-19 pandemic, the increasing demand for sustainable tourism, and the push for innovation within the sector. As travelers become more environmentally conscious, there is growing pressure on coastal tourism destinations to adopt more sustainable practices. This includes reducing the environmental impact of tourism infrastructure, improving waste management systems, and promoting eco-friendly tourism activities such as low-impact cruises, sustainable hotels, and nature-based recreation.

Technological advancements, such as the rise of digital platforms for booking and sharing travel experiences, will also transform the way tourists interact with coastal destinations. By embracing these changes, coastal tourism can evolve to meet the needs of modern travelers while supporting local economies and preserving the natural beauty of coastal areas.

Conclusion

Coastal tourism remains a cornerstone of the EU Blue Economy, contributing significantly to the GVA, employment, and economic vitality of coastal regions. Despite challenges such as seasonality, the COVID-19 pandemic, and environmental concerns, the sector is resilient and poised for continued growth. By promoting sustainable practices, investing in infrastructure, and developing the skills of future generations, coastal tourism can thrive while maintaining its role as a key player in the broader blue economy. With a renewed focus on sustainability and innovation, the future of coastal tourism looks bright, offering opportunities for economic development while ensuring the preservation of Europe's treasured coastal and maritime environments.

2.2 Evaluation of Technology Use in the Blue Economy

The Black Sea Basin's blue economy is undergoing a transformation thanks to the use of cutting-edge technology, which provide game-changing solutions to boost economic growth, encourage sustainability, and increase productivity. The health of its ecosystems and the lives of those that depend on them are in danger due to a number of issues, such as overfishing, pollution, and climate change. This region is rich in marine resources and biodiversity. Core sectors of the blue economy are changing as a result of technological breakthroughs that have a wide range of applications, from autonomous vessels and digital platforms for stakeholder interaction to smart aquaculture systems.

The integration of sustainable practices in fisheries, marine energy, maritime transportation, and coastal tourism is made easier by these advances, which also maximize operational efficiency and resource management. For example, real-time monitoring of fish stocks and environmental conditions is made possible by Internet of Things (IoT) sensors, which helps make better decisions. Additionally, augmented reality applications are raising awareness of marine conservation while improving the coastal tourism experience for visitors. Through the use of technology, the Black Sea Basin may establish itself as a pioneer in incorporating innovation into sustainable marine operations, ultimately supporting the more general objectives of economic resilience and environmental preservation.

As a catalyst for greater productivity, sustainability, and economic growth throughout the Black Sea Basin, innovative technologies are revolutionary for the expansion of the blue economy. By addressing complicated issues and paving the road for sustainable development, these innovations enable the optimization of important industries including fisheries, aquaculture, marine renewable energy, ocean logistics, and coastal tourism. This section examines the ways in which technology is changing certain industries and offers chances to expand these developments throughout the area.

Fishing was once considered a very traditional industry, but now is classified as an industry subject to a revolution in precision tools and satellite-based monitoring systems. These technologies enable real-time monitoring of fishing activities to prevent illegal, unreported, and unregulated fishing by ensuring compliance with international standards and fostering ethical practices. They account for long-term ecological and economic sustainability related to fisheries by preserving marine biodiversity and maximizing the use of productive resources on marine economic activities.

In aquaculture, for example, the integration of Internet of Things (IoT)-enabled solutions like automated feeding systems and environmental monitoring sensors has transformed fish farming processes. These innovative technologies offer real-time insights into water quality, fish health, and feed consumption, thus reducing waste and improving yield. Utilizing these innovations will help the aquaculture enterprises in the Black Sea Basin to increase their efficiency, as well as achieve environmental sustainability targets.

Another area seeing significant technological advancement is marine renewable energy. Tidal and wave energy systems is developing and proves that the ocean can be used for plugging as the source of clean energy. The Black Sea area contains significant potential for floating wind farms and tidal energy converters, which can help diversify the energy mix and reinforce regional decarbonisation and anti-fossil fuel dependency efforts.

Recent developments in technology, including autonomous vessel technology, new digital navigation tools and energy-efficient propulsion systems have had a positive impact on the maritime transport sector. Backed by artificial intelligence and machine learning that reduces human error, autonomous shipping initiatives drive down operational costs and greenhouse gas emissions. With these innovations Regional trade routes can vastly improve the routes trade is already taking, they can become more economical and environmentally friendly.

A multitude of applications of digital technologies is also redefining coastal tourism, a sub-sector of the blue economy. Therefore, AR and VR tools enhance capabilities that make cultural heritage and ecological diversity in coastal regions attractive to eco-friendly tourists. In addition, data analytics platforms allow for the creation of personalized marketing strategies that ensure the promotion of tourism development in sustainability and community engagement principles.

Dozens of opportunities for more technological advances still exist in the Black Sea Basin. Big Data analytics and Artificial Intelligence can improve resource management through predictive data on marine ecosystems and Supply Chain logistics.



Blockchain enhances traceability and transparency in the seafood supply chains, thus instilling consumer confidence and promoting responsible trade. Reducing damage to the species would mean the use of robotics and autonomous underwater vehicles (AUV) which would allow for monitoring of the environment, increasing biodiversity, and ensuring that subsea technologies are maintained, ultimately promoting industrial development while maintaining the integrity of ecosystems.

Collaboration amongst regional stakeholders, including businesses, academic institutions, and governments, is necessary for the incorporation of these technology solutions. The Black Sea Basin may establish itself as a pioneer in the sustainable blue economy and serve as a model for other areas of the world by cultivating alliances and making investments in innovation.

2.2.1 Identification of Successful Case Studies

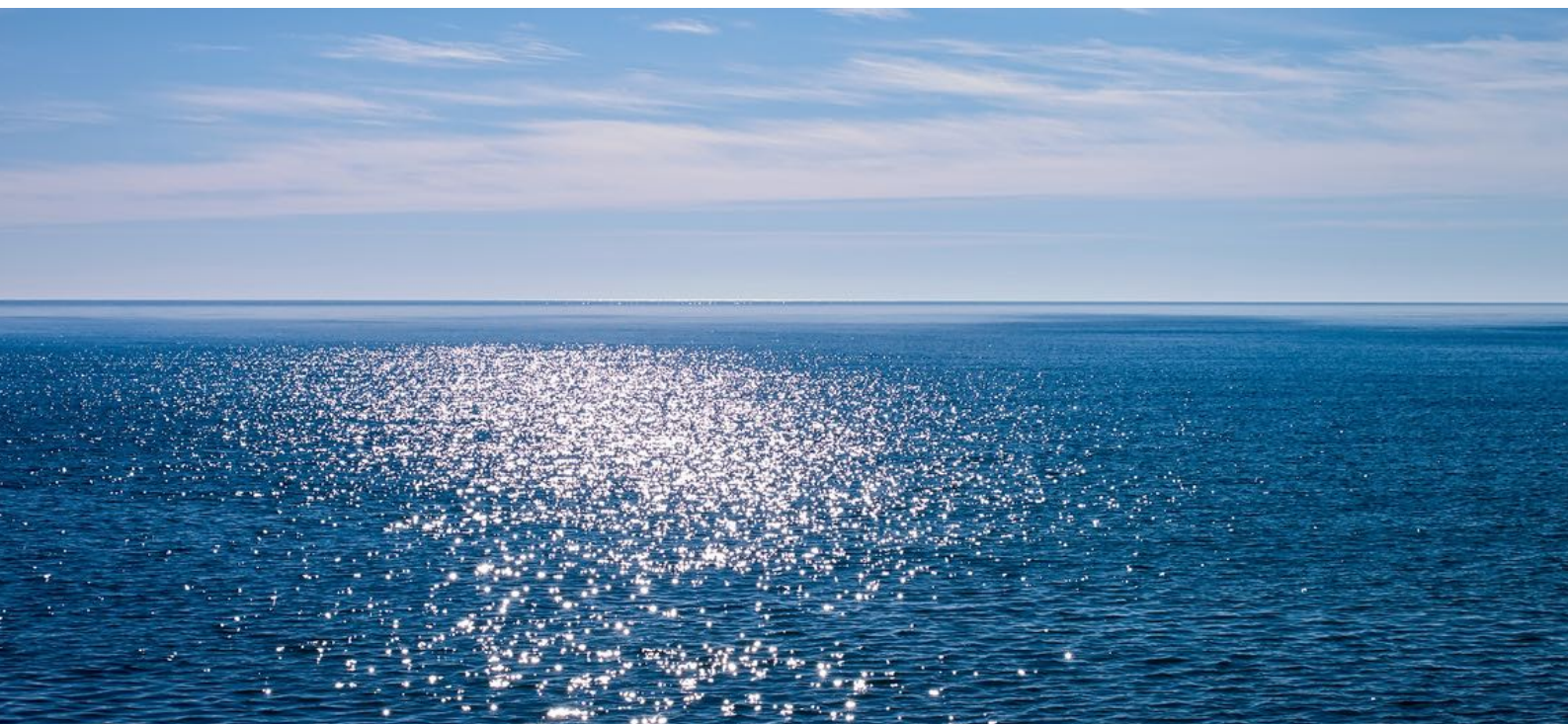
Integration of new technologies has brought significant change to the fisheries sector, redefining conventional practices and enabling the implementation of novel strategies for sustainable management. With increasing challenges—such as overfishing, unlawful activities, and environmental deterioration—there is a need for instruments like precision fishing systems and satellite tracking platforms to ensure regulation and protection of marine biodiversity and long-term sustainability of resources.

Global Fishing Watch is emblematic of how technology can transform fisheries management. Combining satellite data, artificial intelligence, and massive data analysis, this global initiative has created a system for transparency in near real time. The platform detects IUU fishing activities by tracking vessel movement through AIS signals and linking this information with satellite imagery. Such a level of transparency is not only discouraging illegitimate conduct, but it also furnishes governments, regulatory agencies, and conservation groups with empirical information to create and implement more effective enforcement measures.

The application of associated systems to the Black Sea Basin possibly offers very considerable gains for local fisheries management. Due to its incredibly rich biodiversity in marine life, along with being an economy that massively relies on fishing activities, the management is faced by problems involving overfishing and IUU activities. Satellite technology will help monitor fishing activity in large open waters; pinpoint non-compliance; ensure quota limits are effectively enforced, and even the observing of conservation laws. This would help to conserve critical habitats and species, which aligns with international efforts toward conserving marine biodiversity.

Moreover, these technological breakthroughs can also improve decision-making processes, in regard to fish stock abundance, seasonal migrations, and dynamics of the ecosystem, by availing accurate information. These insights are helping policymakers develop adaptive management strategies that consider the increasing environmental variations in relation to changes in temperature and disturbance of habitats that concern the marine ecosystems. Besides, predictive analytics integrated within tracking systems can further assist in forecasting stock depletion or locations that may need urgent conservation interventions.

The socioeconomic arguments in favor of such technological innovations are no less compelling. The transparent monitoring systems protect small-scale fishers whose livelihoods are most often undermined by IUU fishing, thus ensuring fair access to marine resources. Strengthened regulation and measures for sustainability can also increase the long-term viability of the fisheries sector, supporting regional food security and contributing to the economic stability of coastal communities reliant on fishing.



Integration of technologies like Global Fishing Watch in the Black Sea region may create an opportunity for greater cooperation among stakeholders. Regional authorities, industry leaders, and environmental groups may find common ground on joint observation platforms to work together in line with a coherent approach to managing fisheries. This would give greater impetus to the region's commitment to sustainable development by making the Black Sea Basin one of the leading regions in balancing economic progress with ecological preservation in the broader framework of the blue economy.

In the final analysis, the integration of these advanced systems signals a significant shift toward data-driven and sustainable practices in fisheries management. By embracing new technologies, the Black Sea Basin is well placed to overcome existing challenges, increase resource efficiency, and become an exemplar of how modern fisheries management can align ecological imperatives with economic goals. The scenario described shows the great potential of technology to transform one of the key pillars of the blue economy into a model of sustainability and resilience.

Norwegian aquaculture has marked its position as a main global player, showing pioneering methodologies that apply Internet of Things (IoT) technology to improve the process of fish farming. Integration of sensors and automated feeding mechanisms in the Norwegian aquaculture enterprises enables constant monitoring of critical factors such as water quality, temperature, oxygen saturation, and health status of the fish populations. IoT-driven innovations, as represented by the eFishery system, provide real-time data for precise feeding schedules, enhancing resource efficiency. This reduces feed waste—a major cause of environmental degradation—while improving fish health and general productivity.

These more advanced systems in the aquaculture industry of the Black Sea hold great potential and may ensure the sustainable development of the region. It can help producers to control the problems of overfeeding and water pollution, as well as reduce disease incidence, ensuring practices that are more ecologically sustainable and economically viable.

Automated feeding systems, as supported by real-time data, optimize both the amount and timing of feed to exactly meet the specific needs of the fish, thereby saving costs and improving resource efficiency. Further, constant monitoring by sensors enables early detection of water quality problems, thus enhancing a good environment for aquaculture and avoiding massive losses due to bad conditions.

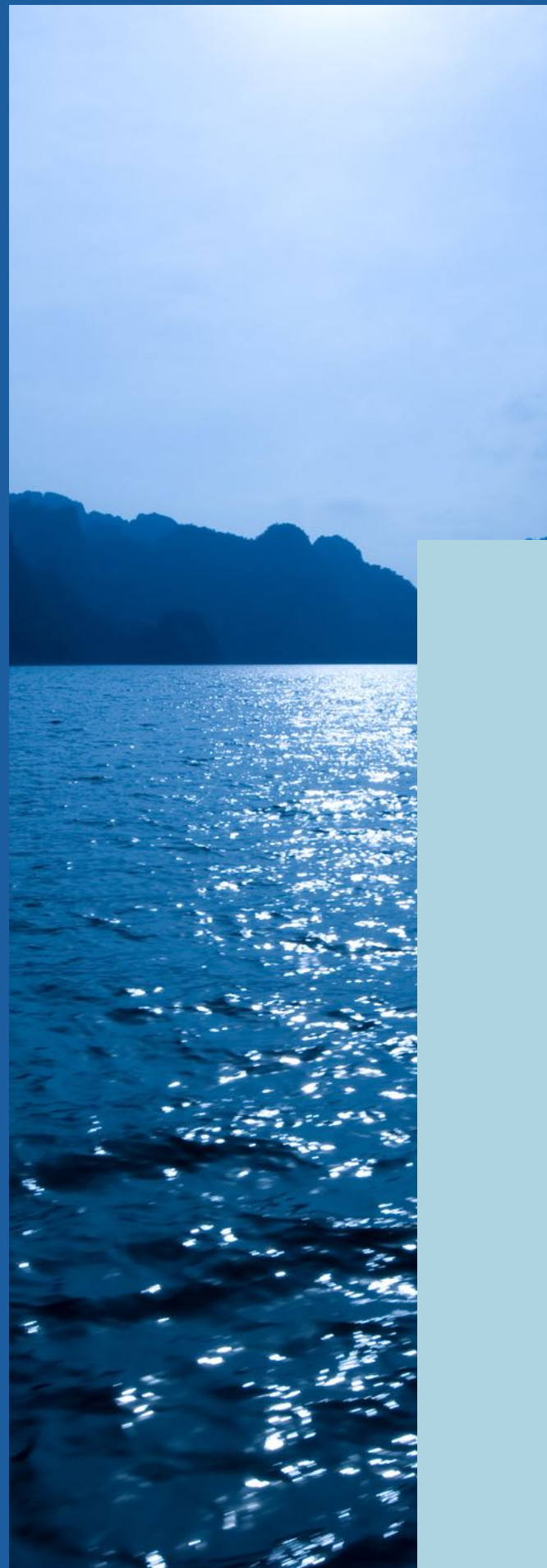
The application of analogous technological approaches in the Black Sea Basin would not only increase aquaculture production but also contribute substantially to environmental protection by reducing nutrient pollution and saving marine ecosystems. The resulting impacts include increased profitability for aquaculture companies, better food security for local communities, and stronger compliance with international sustainability criteria. By adopting these innovations, the Black Sea region could actually bring its aquaculture practices into line with international standards and develop a far stronger and more sustainable blue economy.

Marine renewable energy is a very strong transformative lever for Greece, using the country's long coastline and favorable marine conditions to support sustainable energy solutions. With its strong maritime tradition and commitment to renewable energy transition, Greece is well placed to harness tidal and wave energy sources from the Black Sea Basin in order to contribute significantly to the country's efforts in energy diversification and decarbonization.

The Greek coastline offers various potential sites for the implementation of cutting-edge marine renewable energy technologies. Tidal energy converters and wave energy-capturing devices can be placed in positions where there are strong marine currents and considerable waves, ensuring that energy can be extracted effectively while keeping the environment sustainable. By leveraging the achievements of analogous projects in areas with similar marine environments, Greece has the potential to establish itself as a regional frontrunner in this burgeoning sector, showcasing the feasibility and expandability of marine energy alternatives.

Some of the widest-ranging benefits of incorporating marine renewable energy into Greece's energy strategy would be economic. It would reduce dependence on imported fossil fuels, thus increasing energy security and stabilizing energy costs for consumers.

Environmentally, it would contribute much toward meeting the country's decarbonization targets, helping to alleviate emissions of greenhouse gases while fostering cleaner energy production. Moreover, such initiatives would drive technological innovation and create new employment opportunities in the development of renewable energies, engineering, and maintenance, underpinning Greece's emergence as a sustainable economy.



Tapping its marine resources, Greece can meet its domestic energy needs sustainably and become one of the leaders in marine renewable energy in the Black Sea Basin. This policy is in line with broader European policies on energy and the environment, thus contributing to a sustainable blue economy, and helping Greece become engaged in regional energy resilience and actions toward climate change mitigation.

Coastal tourism is among the most dynamic and fastest-growing sectors of the Blue Economy, offering tremendous potential for economic growth, while preserving culture and ensuring ecological sustainability. Integration with high-tech digital technologies has been game-changing in terms of transforming the way that destinations are now marketed and experienced by tourists. An example of that is Visit Greece, where AR and data analytics come together in a really cool way to create immersive, personalized experiences for travelers. By using AR, tourists can visit historical sites and natural landmarks virtually, therefore getting more information about the region's rich cultural heritage and ecological diversity. The technologies help not only to increase user engagement but also to promote eco-tourism by encouraging sustainable travel behaviors.

Adoption of similar AR-driven tools in the Black Sea region would be a game-changer for stakeholders in highlighting the unique attributes of their coastal areas. Using AR, through interactive storytelling and digital overlays, historical narratives are brought to life in a way that allows visitors to connect with local traditions, architecture, and biodiversity in an enriched manner. For example, augmented reality applications can deepen a regular visit to a coastal monument by giving an immersive exploration of its historical significance, in a way that fosters a closer relationship between visitors and the place. Data analytics is important in amplifying these efforts; hence, destination managers and tourism operators can now make better decisions about visitor preferences, track travel patterns, and develop targeted marketing campaigns. It allows for the refining of tourism strategies, based on the analysis of trends, including peak travel periods and preferred activities, in order to relieve environmental pressure during peak seasons and to more equitably distribute tourism benefits among less developed regions. Moreover, digital platforms can advocate for environmentally sustainable practices, including responsible accommodations and low-impact transportation alternatives, to make sure that tourism growth aligns with environmental conservation goals. The extensive implications of these technological incorporations are significant.

By enhancing eco-tourism, this place will be able to attract new environmental tourists who consider sustainability an important factor in their travels. This change not only vitalizes local economies but also encourages the preservation of cultural heritage and the protection of natural ecosystems. This resulting interplay between technology, culture, and sustainability makes the Black Sea region a perfect place for responsible tourism and thus a model for other coastal regions in the world to follow.



2.2.2 Opportunities for Technological Advancements

There are numerous chances in the Black Sea Basin to use state-of-the-art technical advancements to support sustainable growth in its blue economy. The region can achieve previously unheard-of levels of efficiency in resource management, environmental preservation, and operational logistics by using disruptive technologies like artificial intelligence (AI) and big data analytics. These developments are crucial to attaining resilience and sustainability in a globally integrated marine ecosystem, not only instruments for economic expansion.

AI and big data have the unmatched potential to completely transform the management of marine resources. In-depth understandings of marine biodiversity and ecosystem dynamics are made possible by the collection and analysis of enormous datasets from many sources, such as satellites, underwater sensors, and environmental monitoring systems. By offering a detailed understanding of fish stock movement patterns, population trends, and ideal fishing periods, such data can help fisheries develop sustainable harvesting strategies. This guarantees the responsible use of marine resources, protecting biodiversity and sustaining the fishing communities' economic vitality. Additionally, because AI algorithms can assess intricate biological data, they can forecast climate change-related disruptions like changes in water temperature and salinity, enabling stakeholders to prepare for and adjust to these changes.

The logistical dimension of the blue economy stands to benefit immensely from AI-driven innovations. For maritime transport, AI technologies can analyze traffic patterns, optimize shipping routes, and predict maintenance needs for vessels, reducing delays and operational costs. Machine learning models can identify inefficiencies in port operations, enabling real-time solutions that streamline cargo handling and minimize turnaround times. The result is not only enhanced economic efficiency but also a substantial reduction in greenhouse gas emissions, as optimized routes and reduced idle times lead to significant fuel savings. These efficiencies are pivotal in ensuring the Black Sea Basin aligns with international decarbonization targets.

Environmental monitoring is another area where these technologies exhibit transformative potential. Big data platforms can monitor trends in ocean health, such as fluctuations in water quality, sediment transport, and pollutant dispersion. These insights allow for the early detection of environmental threats, ranging from algal blooms to oil spills, enabling swift and targeted intervention. AI further augments this capability by predicting future risks based on historical patterns and current data. For example, AI-powered models can anticipate the spread of marine pollution and suggest mitigation strategies to minimize ecological damage. These proactive approaches ensure the long-term health and resilience of marine ecosystems while reinforcing the region's commitment to environmental stewardship.

The integration of big data and AI also extends to fostering innovation in marine renewable energy. Predictive analytics can optimize the placement and operation of offshore wind farms, tidal turbines, and wave energy converters, ensuring maximum efficiency and minimal environmental disruption. By analyzing oceanographic data and modeling energy outputs, these technologies can support the region's transition to renewable energy sources, reducing its reliance on fossil fuels and contributing to global efforts to combat climate change.

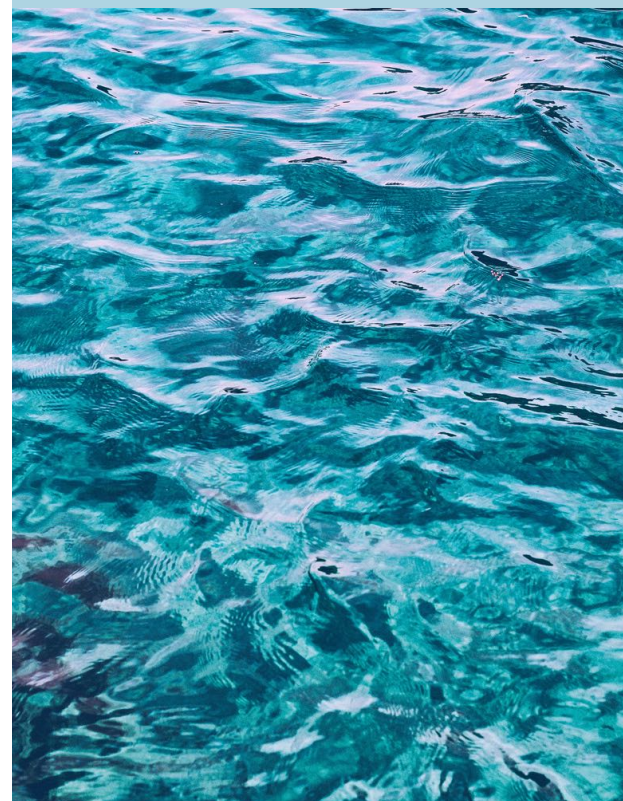
While the potential of these technologies is vast, their successful implementation requires a multi-faceted approach. Investments in digital infrastructure, such as high-speed data networks and advanced computational systems, are crucial. Capacity-building initiatives must empower local stakeholders, including industry professionals, policymakers, and researchers, to utilize and adapt these tools effectively. Furthermore, fostering regional collaboration is essential to harmonize data-sharing practices, align technological standards, and address transboundary challenges.

By embracing big data and AI, the Black Sea Basin can set a benchmark for innovation-driven sustainability in the blue economy. These technologies offer a pathway not only to address current challenges but also to anticipate and mitigate future risks. In doing so, the region can emerge as a global leader in balancing economic development with ecological integrity, providing a model for sustainable marine resource utilization worldwide.

There is a lot of room for technological innovation in the Black Sea Basin, including chances to use cutting-edge developments that support international sustainability goals. In addition to offering potential financial and environmental advantages, these developments strengthen the blue economy's resilience, efficiency, and transparency in the area. Blockchain technology stands out among these potential as a game-changing instrument for promoting accountability and trust throughout supply chains.

In the blue economy, blockchain technology has unmatched uses, especially when it comes to guaranteeing the traceability of marine goods from the ocean to the plate. Blockchain makes it possible to precisely document each step of the supply chain, including harvesting, processing, distribution, and retail, by offering an unchangeable log of transactions. Customers are reassured by this degree of traceability that their seafood is sourced ethically, responsibly, and in accordance with international standards. For example, blockchain platforms provide visible evidence of adherence to environmentally friendly practices by securely storing certifications attesting to sustainable fishing methods. Beyond traceability, blockchain has the potential to fight fraud that compromises the integrity of the blue economy.

The decentralized structure of blockchain can efficiently reduce common issues in global seafood markets, such as mislabeled seafood and counterfeit certifications. Blockchain reduces the possibility of tampering by making sure that every transaction is validated and documented, which increases market and consumer confidence. Additionally, by giving authorities instant access to validated data, this technology can simplify regulatory compliance by lowering administrative costs and improving enforcement capabilities. Blockchain has wider ramifications for promoting sustainability and accountability in the Black Sea Basin than just seafood supply chains. It can facilitate open reporting of carbon emissions, allowing interested parties to track the advancement of decarbonization objectives. Furthermore, by enabling safe and effective data exchange, blockchain can improve cooperation between regional players, including businesses, academic institutions, and legislators, guaranteeing that group initiatives are data-driven and in line with sustainability goals.



The implementation of blockchain technology is a crucial step in the Black Sea Basin's efforts to establish itself as a pioneer in the sustainable blue economy. The region can guarantee ethical behaviors, boost customer confidence, and promote a transparent culture that supports sustainable growth by utilizing its capabilities. To fully realize blockchain's promise and turn obstacles into chances for advancement and creativity, cooperative investments in training and infrastructure will be crucial.

The Black Sea Basin has enormous potential for using technical advancements to solve urgent problems and open up fresh avenues for economic development and sustainability. As the area adopts innovations in a number of blue economy sectors, a number of significant opportunities present themselves that have the potential to revolutionize the region and contribute to global sustainability objectives.

The creation of digital platforms that promote improved stakeholder interaction is one noteworthy opportunity. Platforms for collaboration created for fishermen, academics, legislators, and other players in the blue economy can act as vibrant centers for information sharing, communication, and cooperative decision-making. By including up-to-date data on maritime resources, trade activity, and environmental conditions, these systems facilitate smooth cooperation. Stakeholders can better handle issues, optimize processes, and coordinate their efforts with regional sustainability goals by centralizing such data.

Beyond operational effectiveness, these digital platforms have the potential to greatly increase policy coherence and inclusivity in decision-making processes. Improved stakeholder communication fosters cooperative solutions by establishing a common awareness of priorities and difficulties. Such platforms, for instance, allow fisheries to exchange real-time data on capture locations and quantities, allowing academics to evaluate the impact on marine ecosystems and allowing policymakers to make dynamic regulatory adjustments.

These platforms also serve as a basis for regional integration and long-term planning. By facilitating cross-border communication, they guarantee that national approaches to the management of common resources in the Black Sea Basin are consistent. By fostering fair resource distribution, lowering conflict, and boosting stakeholder trust, this strategy opens the door for sustainable development.

The Black Sea Basin may promote accountability and openness by utilizing digital platforms. These systems can incorporate blockchain technology to guarantee supply chain traceability, especially in aquaculture and fisheries. This degree of openness improves consumer confidence, promotes moral behavior, and fortifies the area's standing in international marketplaces.

The Black Sea Basin's blue economy has enormous and diverse potential for technological breakthroughs, including a wide range of prospects that might greatly improve resource management, encourage supply chain transparency, and protect vital marine habitats. Collaboration amongst stakeholders, from youth organizations and blue economy businesses to regional government and research institutes, is crucial as the region adopts these technologies more and more. Creating strong alliances will make it possible to exchange best practices, resources, and expertise that are essential for attaining resilience and sustainability over the long run. Furthermore, the industry can become more accountable and trustworthy by investing in innovative solutions like blockchain for fisheries traceability and collaborative digital platforms for real-time data exchange. Aligning regional policies with international best practices is crucial to maximizing the advantages of these technology breakthroughs and ensuring that environmental preservation and economic growth coexist. In addition to securing its place as a model for sustainable blue economic growth, the Black Sea Basin can make a significant contribution to the global agenda on ocean health and sustainability by accomplishing this, ensuring a future in which marine ecosystems and coastal populations coexist peacefully.

2.3 Sustainability Practices in the Blue Economy

In order to meet social and economic demands and maintain the long-term health of marine and coastal ecosystems, the blue economy must adopt sustainable methods. An examination of the Black Sea Basin's present environmental and social strategies identifies both potential for promoting sustainable practices that can result in more resilient and equitable communities as well as important obstacles that must be addressed.

Limited adherence to sustainability rules, especially by smaller businesses, is one of the blue economy's most urgent problems. Many of these companies operate with little knowledge of current laws and industry best practices, which can have a negative effect on the environment. Resource limitations and restricted access to training and support systems—which are crucial for comprehending and putting sustainability measures into practice—are frequently the causes of this ignorance. Small-scale fishers and aquaculture operators may therefore participate in activities that lead to the overexploitation of marine resources, making habitat degradation and biodiversity loss even more problematic. The ecological health of the Black Sea and its environs is seriously threatened by the cumulative effect of these activities, underscoring the necessity of focused capacity-building programs that encourage smaller businesses to manage their resources sustainably.

Overuse of marine resources is still a major problem, in addition to awareness and compliance concerns. Fish stocks are in decline, and vital habitats like wetlands and coral reefs are being harmed by the strains of increased fishing and industrial activity. The livelihoods of coastal populations that rely on healthy ecosystems for their survival are also at risk due to excessive resource exploitation, which also endangers marine biodiversity. Stronger enforcement of laws, the creation of marine protected areas, and the encouragement of sustainable fishing methods that can aid in the recovery of reduced stocks and the preservation of vital habitats are just a few of the many strategies needed to address this issue.

There are plenty of chances to improve sustainable practices in the blue economy in spite of these obstacles. Using the concepts of the circular economy offers a viable solution to enhance resource reuse and waste management in the maritime industry. Businesses can reduce their environmental impact and create economic value at the same time by implementing strategies that put recycling, waste reduction, and resource recovery first. Initiatives that turn organic waste and bycatch from fisheries into products with additional value, like fish meal or organic fertilizers, for example, can drastically cut waste while giving companies new sources of income. By generating employment possibilities in nearby areas and diversifying sources of income, this strategy not only promotes environmental sustainability but also economic resilience.

Although the Black Sea Basin's blue economy has many sustainability obstacles, there are also many chances for change. Stakeholders can create a more resilient and sustainable blue economy by emphasizing the development of smaller business capacity, enforcing sustainability regulations, and encouraging creative approaches like sustainable aquaculture and circular economy concepts. In order to achieve ecological balance and social fairness in the area and, eventually, guarantee a prosperous blue economy for future generations, it will be imperative to address these issues and seize these opportunities.

2.3.1 Challenges and Opportunities Challenges

Limited adherence to sustainability standards, especially by smaller businesses, is one of the biggest issues facing the blue economy. Due to their frequent ignorance of current laws and sustainable business practices, many small-scale operations may not always follow environmental stewardship guidelines. Resource limitations that make it difficult to obtain the assistance and training required to implement sustainable practices exacerbate this lack of understanding.



According to the International Maritime Organization (IMO), there are often large gaps in compliance because smaller businesses lack the financial and technical means to invest in sustainable practices and technology (IMO, 2020). Because of this, activities like overfishing and habitat degradation still pose a threat to marine ecosystems, which emphasizes the necessity of extensive educational programs meant to raise knowledge and capacity among these stakeholders.

Another urgent problem that jeopardizes sustainability initiatives is the overexploitation of marine resources. Marine ecosystems are under tremendous strain due to the rising demand for seafood brought on by population increase and shifting dietary choices. Due to this demand, unsustainable fishing methods have been used in many areas, depleting important fish species and upsetting marine food webs. About 60% of the world's fish stocks are either overfished or fully exploited, according to the United Nations Environment Programme (UNEP), endangering marine biodiversity and the livelihoods of coastal communities that rely on these resources (UNEP, 2019). Therefore, in order to guarantee sustainable fishing methods and the preservation of marine ecosystems for future generations, effective management measures must be put into place.

Furthermore, biodiversity and coastal resilience are seriously threatened by the destruction of marine habitats like mangroves and coral reefs. According to the World Resources Institute (WRI), human activities such as pollution, overfishing, and climate change are threatening over 50% of coral reefs globally (WRI, 2021). These ecosystems are essential for coastal preservation, marine biodiversity, and the lives of populations that depend on tourism and fishing. Governments, local communities, and the corporate sector must work together to address habitat degradation in order to create and implement efficient conservation plans that protect these important ecosystems.

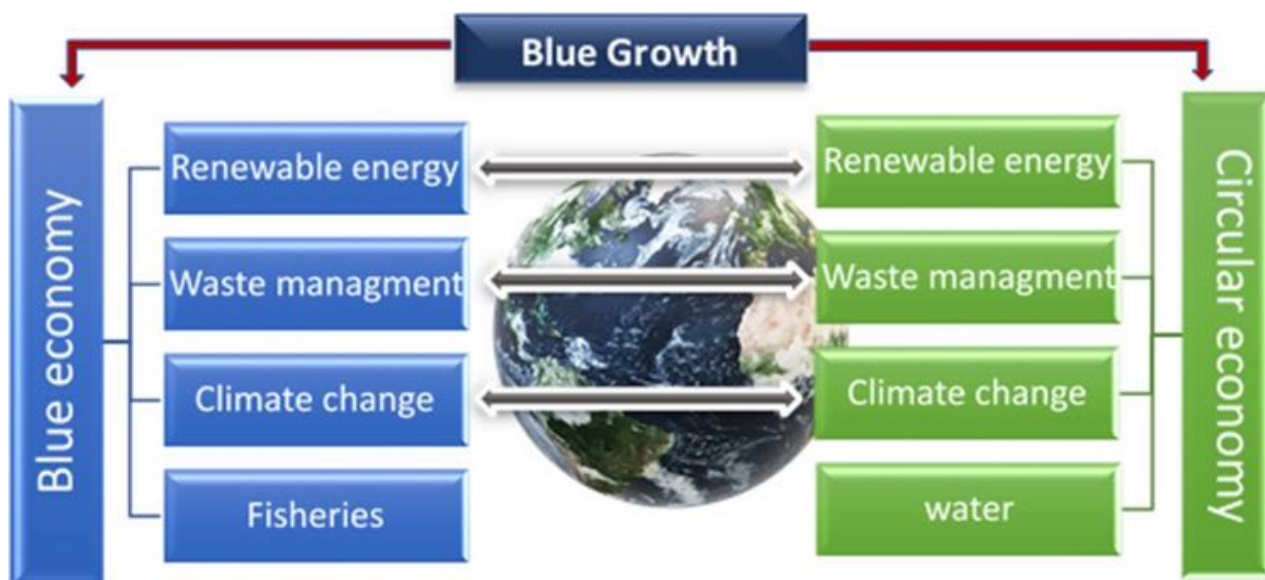
Notwithstanding these obstacles, the blue economy has significant potential for improving sustainability standards. A revolutionary strategy that can enhance waste management and encourage resource reuse is the use of circular economy concepts. Businesses can reduce waste and increase resource efficiency by adopting a circular approach instead of the linear "take-make-dispose" paradigm. Innovative projects in the fishing sector, for example, are investigating the utilization of fish processing byproducts, turning waste into valuable goods like fishmeal or biofuels. In addition to lessening the impact on the environment, this gives businesses access to new sources of income.

According to research by the Ellen MacArthur Foundation, adopting a circular economy could result in yearly savings of \$1 trillion for global businesses by 2025 (Ellen MacArthur Foundation, 2020).

Additionally, the aquaculture industry presents encouraging opportunities for sustainable growth. Integrated multi-trophic aquaculture (IMTA) is one sustainable aquaculture technique that offers chances to improve environmental stewardship and lessen the strain on wild fish stocks. By growing multiple species in complementary ways, IMTA maximizes resource use and reduces environmental effect. One species' waste is used as a source of nutrients for another. According to research, IMTA can support ecological balance and greatly increase overall output (Chopin et al., 2010). Stakeholders may support food security, economic resilience, and marine ecosystem conservation by funding sustainable aquaculture technology and practices.

Additionally, the significance of involving local populations in sustainability programs is becoming increasingly apparent. More efficient and just governance systems may result from giving coastal communities the tools they need to actively manage marine resources.

To make sure that the interests and objectives of communities are taken into account, participatory approaches that include local stakeholders in decision-making processes are crucial. To improve the sustainability of fisheries and other marine resources, the Food and Agriculture Organization (FAO) promotes community-based management techniques that make use of local knowledge and experience (FAO, 2020). Stakeholders can develop shared responsibility for the care of marine environments and establish trust by encouraging cooperation and co-management.



Analysis of relationships between Blue Economy and Circular Economy

2.3.2 Current Environmental and Social Approaches

The blue economy uses a range of social and environmental strategies to support resilience and sustainability in marine environments. These tactics are essential for preserving biodiversity, cutting carbon emissions, and strengthening local communities whose livelihoods rely on marine resources. We can find areas for improvement and best practices by analyzing how effective these strategies are, which will ultimately help create a more sustainable blue economy.

The creation of Marine Protected Areas (MPAs) is one of the most important environmental policies. MPAs are areas set aside specifically for the purpose of managing or limiting human activities in order to preserve marine biodiversity and ecosystems. Because they enable marine species to flourish and ecosystems to recover from overexploitation and degradation, they are vital conservation tools. According to studies, MPAs can boost fish populations, promote biodiversity, and make marine habitats more climate change resilient. Nevertheless, MPA coverage in the Black Sea region is still insufficient to adequately protect important ecosystems and hotspots for biodiversity. The International Union for Conservation of Nature (IUCN) states that attaining sustainable fisheries management and maintaining ecological integrity depend on growing the network of MPAs (IUCN Marine Protection Data). This calls for collaborative efforts among governments, non-governmental organizations, and local communities to identify and designate new MPAs, while also implementing effective management practices to ensure their long-term success.

Apart from MPAs, renewable energy initiatives are playing a bigger role in the blue economy as a way to support low-carbon energy options. Utilizing renewable energy sources like wind, solar, and tidal power has enormous promise in coastal areas. Reducing greenhouse gas emissions, preventing climate change, and enhancing energy security in coastal areas all depend on the switch to renewable energy.

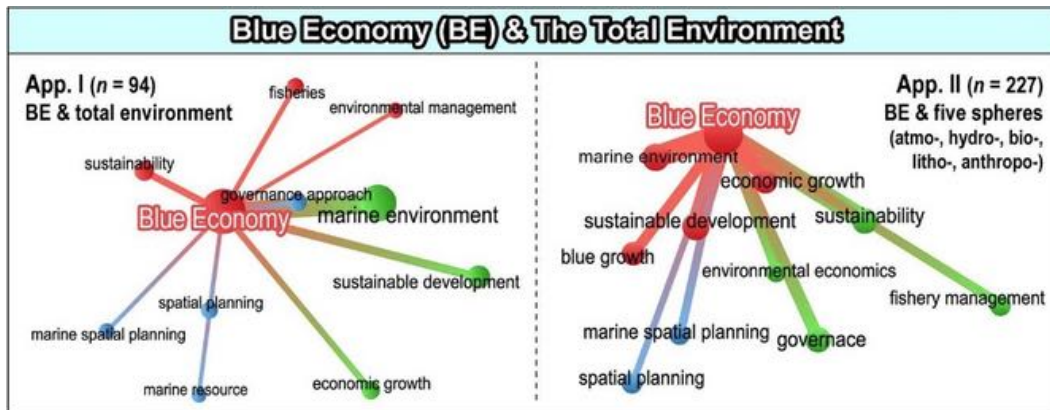
Wave energy converters and offshore wind farms are two initiatives that are gaining popularity since they minimize environmental effect while producing sustainable energy. Deploying renewable energy in coastal locations can boost local economies, generate employment opportunities, and contribute to the overall sustainability of the blue economy, according to the International Renewable Energy Agency (IRENA) (IRENA, 2021). Coastal areas can invest in renewable energy initiatives can not only reduce their carbon footprint but also promote a shift towards a more sustainable energy future.

On the social front, promoting community-based tourist projects is an essential tactic for generating revenue and empowering locals. Through the promotion of their culture, customs, and natural resources, community-based tourism enables locals to take part in the travel business. In addition to offering communities financial advantages, this strategy promotes a sense of accountability and ownership for environmental management. Community-based tourism can improve local lives while conserving cultural assets and encouraging sustainable practices, according to the United Nations Development Programme (UNDP) (UNDP Blue Economy Policy Brief). In order to ensure that tourism development is in line with the social and environmental goals of the community, successful examples of community-based tourism in coastal regions frequently entail partnerships between local communities, governmental institutions, and non-governmental organizations.

Furthermore, attaining sustainable results requires including local populations in marine resource management decision-making processes. Policymakers can create more equitable and effective management plans that take into account the needs and goals of coastal communities by embracing local knowledge and viewpoints. In the end, participatory governance methods can promote a culture of conservation and stewardship by increasing community support and buy-in for sustainability programs.

The blue economy's present social and environmental strategies are crucial for fostering resilience and sustainability in maritime environments. Community-based tourism programs and participatory governance strengthen local people and improve their ability to manage resources sustainably, even as the creation of MPAs and the encouragement of renewable energy projects offer significant environmental benefits. Stakeholders may collaborate to build a more equitable and sustainable blue economy that benefits people and the environment by implementing these ideas.



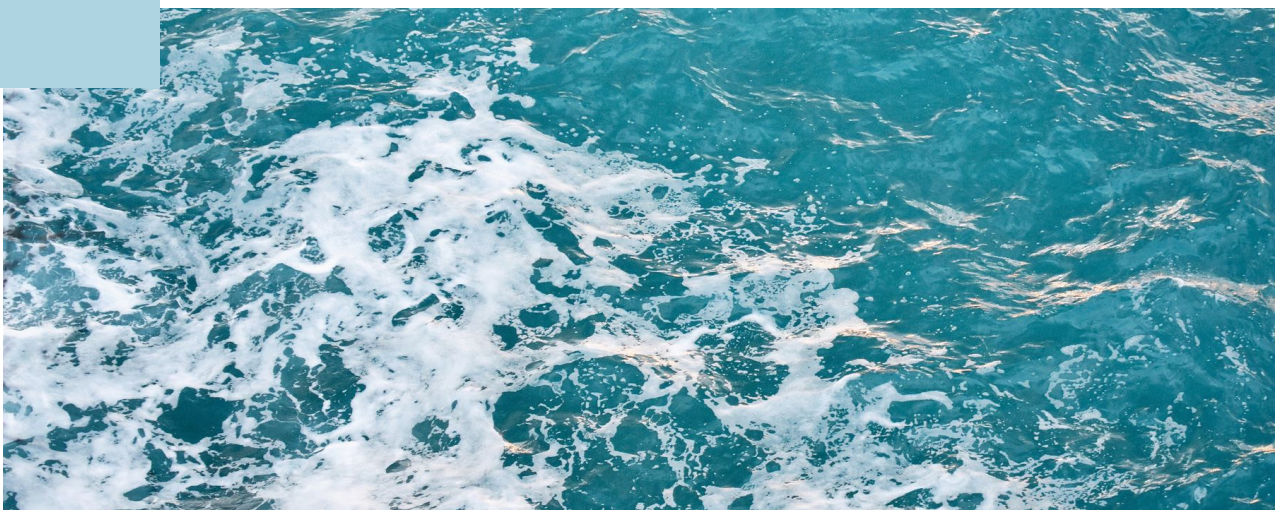


2.4 Identifying Gaps and Opportunities

Particularly in environmentally rich but economically difficult areas like the Black Sea Basin, the idea of the "blue economy," which aims to capitalize on the economic potential of ocean and marine resources, is becoming more widely acknowledged as a key component of sustainable development. This comprehensive strategy makes sure that economic activity does not jeopardize the health of ocean environments by emphasizing both economic growth and the sustainable management of marine ecosystems. In this regard, determining the gaps that currently exist is essential to developing policies that maximize economic benefits and encourage sustainable practices.

Inconsistent funding sources for innovation, particularly for smaller businesses, are a major problem for the blue economy. Many of these companies find it difficult to get funding and assistance for creating environmentally friendly practices and technologies. Because of this, their ability to support the blue economy is frequently neglected, which results in lost chances for both environmental stewardship and economic progress. Furthermore, a significant obstacle to well-informed decision-making is the dearth of thorough data on marine biodiversity, which restricts stakeholders' capacity to efficiently monitor and manage marine ecosystems.

Moreover, social factors play a pivotal role in the success of the blue economy. Marginalized communities, particularly youth and women, are frequently excluded from economic opportunities within this sector. This exclusion not only hinders individual livelihoods but also reduces the diversity of ideas and innovations essential for addressing complex challenges in marine resource management. By identifying and addressing these social gaps, the blue economy can become more inclusive, fostering greater engagement from all stakeholders and promoting equitable access to the benefits derived from marine resources.



2.4.1 Economic Factors

The disparity in the financial sources available to support innovation, especially for smaller businesses, is one of the biggest gaps in the blue economy. These companies, which are essential to the blue economy's health, frequently find it difficult to obtain the funding required for R&D and the adoption of creative strategies that could strengthen their competitive advantage. Smaller businesses often lack access to traditional funding sources like bank loans and venture capital because of perceived risks and inadequate collateral, which limits their capacity to innovate and expand. Small and medium-sized businesses (SMEs) are frequently at the forefront of innovation in the blue economy, and this financial disparity restricts their ability to contribute to this sector and stifles their potential for revolutionary growth.

Notwithstanding these obstacles, there is a significant chance to close this gap by establishing microgrants and encouraging public-private collaborations. Without the onerous constraints of traditional finance, micro-grants, which allocate modest sums of money to certain projects or initiatives, might allow smaller businesses to test out creative solutions. Because these incentives enable businesses to test out novel concepts that improve efficiency and sustainability, they can be very successful in promoting innovation in the marine industry. Additionally, by combining resources and knowledge from both industries, public-private collaborations can foster innovation. Through resource pooling, stakeholders can create tailored financial products that cater to the unique requirements of smaller businesses, enabling the creation of scalable solutions to problems like pollution, habitat degradation, and overfishing.

One pertinent illustration of the successful application of such systems is the European Maritime and Fisheries Fund (EMFF). With a focus on innovation and sustainability, this fund seeks to assist projects that improve the competitiveness and sustainability of the European fisheries and aquaculture industries. According to research, focused funding initiatives can boost innovation investment, SMEs' financial performance, and environmental results (OECD, 2019; European Commission, 2020). Stakeholders can build a stronger financial ecosystem that supports innovation, sustainability, and economic resilience in the blue economy by combining resources from the public and private sectors.

2.4.2 Environmental Factors

A major obstacle to efficient ecosystem management and conservation initiatives is the Black Sea Basin's environmental landscape, which is characterized by a large data gap about marine biodiversity. Overfishing, pollution, and climate change are putting this area—which is home to a wide variety of marine species and habitats—under previously unheard-of strain. Policymakers and other stakeholders are unable to make well-informed decisions that might promote sustainable practices meant to protect marine ecosystems due to a lack of thorough and trustworthy data. For example, it is difficult to apply efficient management techniques or evaluate the effects of human activity on these essential resources without precise evaluations of species populations and habitat conditions.

There is a rare chance to improve environmental stewardship in the Black Sea by filling this important gap. To improve ecological monitoring and data gathering activities, the nations that surround the basin must strengthen their research relationships. Partnerships between governmental entities, non-governmental groups, and academic institutions can help stakeholders create cooperative research projects that result in the creation of common databases and standardized procedures. These cooperative frameworks encourage the cross-border exchange of best practices in addition to making it easier to gather high-quality data. Regional cooperation is facilitated by initiatives such as the Black Sea Commission and its Integrated Monitoring and Assessment Programme (IMAP), which highlight the importance of teamwork in monitoring and safeguarding the Black Sea ecosystem (Black Sea Commission, 2020).

Additionally, the implementation of citizen science initiatives can increase public awareness and involvement in marine conservation by enabling local populations to take part in data gathering and monitoring activities. The long-term viability of conservation initiatives depends on fostering a sense of ownership and responsibility for the marine environment, which can be achieved by including stakeholders at all levels, from local fishermen to researchers (Katsanevakis et al., 2011).

Ultimately, the enhancement of data on marine biodiversity is vital for informing policy decisions and driving effective conservation strategies that align with the principles of the blue economy. As stakeholders work together to bridge this knowledge gap, they can develop more robust frameworks for managing marine resources, ensuring that economic activities do not compromise the health of marine ecosystems. Such efforts are essential for sustaining the ecological integrity of the Black Sea while simultaneously promoting economic development that respects environmental limits (Santos et al., 2022).

2.4.3 Social Factors

Socially, a significant gap exists in the engagement of stakeholders within marginalized communities, particularly among youth and women, who could play a pivotal role in the blue economy. The underrepresentation of these groups not only limits their access to economic opportunities but also diminishes the diversity of perspectives and innovations that are essential for the sustainable development of marine resources. Marginalized communities often possess unique insights and traditional knowledge that can significantly contribute to more effective resource management and sustainability practices. However, their voices are frequently overlooked in decision-making processes, leading to policies and initiatives that may not fully address the needs of all stakeholders (Bennett et al., 2016).

Building capacity through skill-based programs designed especially for women and adolescents in the blue economy is a great way to solve this difficulty. These courses may concentrate on fostering skills in sustainable practices, entrepreneurship, and the management of maritime resources.

Programs such as the Women and Youth in Fisheries Program, for example, demonstrate the possibility of providing participants with specialized training that gives them the tools they need to succeed in marine-related fields (FAO, 2018). In addition to improving these underprivileged groups' economic prospects, empowering them also adds a variety of perspectives and methods to the blue economy.



Promoting engagement and inclusivity is essential for improving social fairness, which can then spur economic growth and innovation. According to research, inclusive decision-making procedures that take into account the viewpoints of many community members produce better results and more creative ideas for the management of marine resources (Berkes et al., 2000). Stakeholders can develop more thorough solutions that address the complex issues affecting marine ecosystems and coastal communities by include the perspectives of women and youth in the discussion.

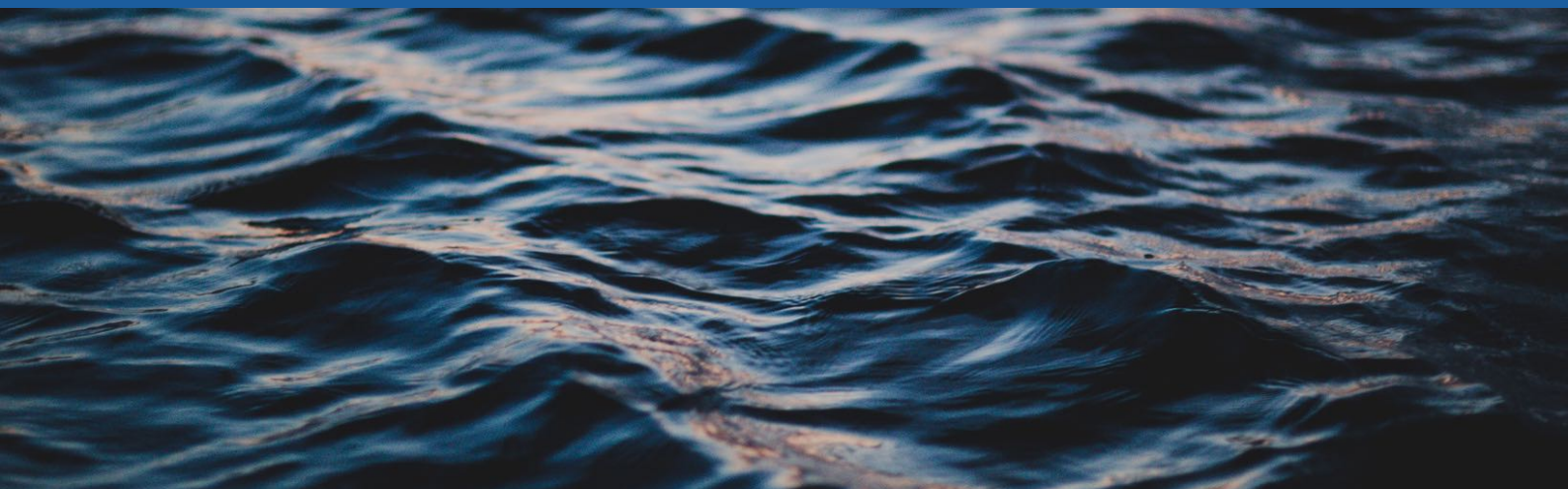
Community resilience and sustainability will also be improved by establishing avenues for these marginalized stakeholders to make significant contributions to the blue economy. We can fully utilize the blue economy by funding empowerment programs that emphasize education, resource access, and mentorship. These investments ensure that resources are handled appropriately for future generations while also benefiting local populations and the general health of maritime habitats.

The analysis of the blue economy's prospects and limitations emphasizes the pressing need for focused interventions in the social, environmental, and economic spheres. In order to promote growth and entrepreneurship in the marine sectors, creative solutions like microgrants and public-private partnerships are required due to economic considerations like the irregularity of funding channels. We can encourage sustainable practices and innovations that benefit the larger economy by enabling smaller businesses to flourish through the establishment of strong financial support mechanisms.

In terms of the environment, the scarcity of information on marine biodiversity in the Black Sea Basin emphasizes how crucial cooperative research projects are. Increasing collaborations between nations and organizations can help with thorough ecosystem monitoring, which can guide the development of regulations that safeguard marine resources and encourage sustainable use. Improved procedures for gathering and exchanging data will enable interested parties to make well-informed choices that strike a balance between environmental preservation and economic expansion.

The low level of participation of underserved populations in the blue economy is a social challenge as well as a chance for change. Youth and women's involvement in the industry can be greatly increased via skill-based programs designed to instill a feeling of accountability and ownership for marine resources. Encouraging these groups improves social equality and community resilience in addition to enhancing the diversity of viewpoints within the blue economy. The blue economy may foster a more resilient and sustainable future by emphasizing inclusive practices, which will be in line with international sustainability objectives.

In the end, closing these gaps offers a way to achieve the blue economy's full potential by establishing a balanced ecosystem in which commercial activity coexists peacefully with thriving marine habitats. The long-term viability of the Black Sea and comparable areas depends on this alignment, which guarantees that the advantages of the blue economy are distributed fairly among all parties involved.



3. STAGE 2: STAKEHOLDER MAPPING

3.1. Identification of Key Stakeholders

Supporting the sustainable blue economy of the Black Sea Basin, its SEAQUEST project represents a long-term strategic effort towards reimagining the marine development in the region with a focus on sustainability, technological innovation, and collaboration among multiple stakeholders. The project relies on the identification, engagement and empowerment of key stakeholders to make successful contributions. The variety and interdependence of blue economy institutions require a very structured approach to the stakeholder map to face the diverse, but complex challenges of the region, whilst taking advantage of the vast opportunities.

Local public authorities are at the heart of this effort. Municipal and regional governments have jurisdiction over key areas of urban planning, waste management, coastal development, and the environment. Moreover, their insights into local contexts and capacity to enact policies on the ground make them indispensable partners in SEAQUEST. Through series of policy dialogues, strategic consultations, and project workshops with these relevant public authorities, SEAQUEST may ensure its resulting recommendations are pragmatic, operationalizable, and contextualized within the framework of existing local governance priorities. Moreover, these authorities serve as a bridge between the project's objectives and the day-to-day realities of the communities they govern, enabling a seamless transition from policy formulation to implementation.

Hence, regional development agencies and transnational organizations, including entities like the Black Sea Economic Cooperation (BSEC) and the Common Maritime Agenda for the Black Sea, play an equally critical role. These organizations provide the framework for cross-border collaboration and offer the technical expertise and financial resources necessary to advance regional objectives. SEAQUEST's alignment with these organizations strengthens its capacity to promote economic cohesion, address shared challenges, and drive sustainable growth across national boundaries. Formal partnerships with these entities not only amplify the project's reach but also embed it within the broader strategy for regional integration.

Furthermore, private sector firms engaging in the blue economy are a powerful and revolutionary force within SEAQUEST. These include businesses in fisheries, aquaculture, marine energy, maritime transport, and coastal tourism, all of which contribute to the region's economic vibrancy. Small and medium-sized firms (SMEs), in particular, drive innovation and employment growth. Their active participation is critical to encouraging sustainable practices and implementing cutting-edge technology. SEAQUEST aims to promote significant connections with these companies through specialized forums, industry roundtables, and technological demonstrations. The project's goal is to increase efficiency, sustainability, and competitiveness in the industry by solving operational difficulties and displaying successful case studies.

Additionally, academic institutions and research organizations serve as indispensable pillars in SEAQUEST's comprehensive stakeholder engagement framework. This strategic alliance encompasses a diverse array of entities, including prestigious universities, specialized marine research centers, and cutting-edge innovation hubs. These partnerships are instrumental in advancing SEAQUEST's mission through their unparalleled contributions to data acquisition methodologies, technological innovation, and capacity enhancement initiatives.

The symbiotic relationship between SEAQUEST and its academic collaborators extends far beyond mere knowledge provision. These esteemed institutions function as the project's scientific bedrock, simultaneously driving innovation through pioneering research collaborations and facilitating the widespread dissemination of critical insights. This dynamic interplay of expertise and resources catalyzes a continuous cycle of knowledge creation and application, positioning SEAQUEST at the vanguard of marine conservation efforts.

SEAQUEST's engagement strategy with these scholarly entities is characterized by its depth and reciprocity. The project actively solicits the involvement of academic partners in the co-creation of sophisticated research methodologies, the implementation of state-of-the-art training protocols, and the rigorous validation of empirical findings. This collaborative ethos ensures that SEAQUEST's outputs are not only grounded in robust, evidence-based research but also adhere to the most stringent standards of scientific rigor and integrity.

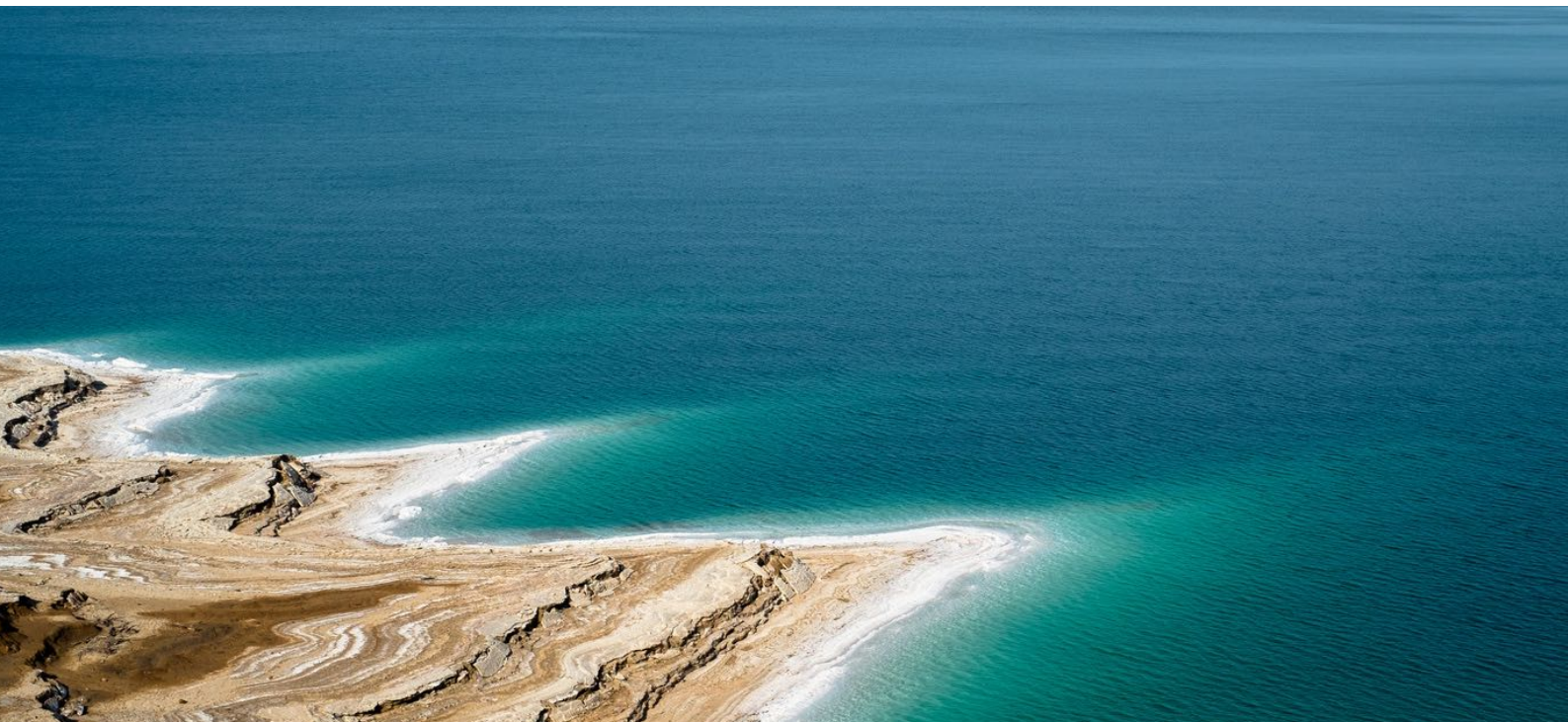
The cultivation of these academic alliances engenders a vibrant ecosystem of intellectual exchange and innovation. This mutually beneficial partnership not only bolsters SEAQUEST's scientific credibility but also contributes significantly to the broader advancement of marine science and the development of sustainable ocean management practices. By leveraging the collective expertise of its academic stakeholders, SEAQUEST is uniquely positioned to address the multifaceted challenges of marine conservation with unprecedented efficacy and insight. In essence, the integration of academic and research institutions into SEAQUEST's stakeholder strategy represents a paradigm shift in collaborative marine conservation efforts. This approach not only amplifies the project's impact but also fosters a culture of continuous learning and adaptation, crucial for navigating the complex and ever-evolving landscape of global marine ecosystems.

Furthermore, non-governmental organizations (NGOs) and advocacy groups are critical to guaranteeing SEAQUEST's inclusion and sustainability. Environmental organizations and marine conservation groups are vital to improving biodiversity protection and encouraging sustainable practices.

These organizations contribute skills in activism, community participation, and environmental stewardship, making them useful allies in tackling environmental issues. Social advocacy organizations, on the other hand, contribute to ensuring that disadvantaged and vulnerable people, such as women, youth, and low-income communities, are included in the project. By including these NGOs within its stakeholder network, SEAQUEST develops a culture of advocacy, accountability, and cooperative conservation.

Youth organizations represent an essential dimension of SEAQUEST's engagement strategy. Young people bring fresh perspectives, innovative ideas, and boundless energy to the table. Their involvement is crucial for fostering entrepreneurship, skills development, and future leadership within the blue economy sector. SEAQUEST aims to empower youth-led associations, entrepreneurial networks, and community groups through tailored capacity-building programs, mentoring initiatives, and networking opportunities. This ensures that the next generation is well-equipped to take on leadership roles in shaping the sector's future.

Policy bodies, both regional and international, such as the European Commission's Directorate-General for Maritime Affairs and Fisheries and the Black Sea Synergy initiative, provide the strategic frameworks that underpin SEAQUEST. These entities ensure that the project aligns with broader European and global objectives, such as the European Green Deal. By maintaining close communication with these bodies, SEAQUEST can contribute policy recommendations, share best practices, and showcase success stories. This alignment enhances the project's credibility and ensures its relevance within the larger context of transnational cooperation.



Moreover, the central role of coastal communities in the SEAQUEST project cannot be overstated. These communities, comprising fisherfolk, tourism operators, local businesses, and residents, form the backbone of the blue economy in the Black Sea Basin. Their livelihoods, cultural heritage, and socio-economic well-being are intrinsically linked to the sustainability of maritime and coastal practices. Recognizing this, SEAQUEST places significant emphasis on their active engagement and empowerment. Through participatory workshops, inclusive community forums, and tailored outreach initiatives, the project ensures that the perspectives, needs, and aspirations of these communities are central to its activities. This participatory approach fosters mutual trust, enhances community buy-in, and ensures that solutions are both locally relevant and socially equitable. By amplifying the voices of coastal communities, SEAQUEST not only addresses their concerns but also integrates their traditional knowledge and innovative ideas into the project's framework, creating a more resilient and sustainable blue economy.

Industry associations and chambers of commerce, as collective representatives of professional groups within the blue economy, play an equally pivotal role in advancing the project's goals. These entities act as crucial intermediaries, bridging the gap between businesses, policymakers, and the broader public. They facilitate the exchange of knowledge, advocate for industry interests, and champion the adoption of best practices across sectors such as fisheries, aquaculture, maritime transport, and coastal tourism. SEAQUEST collaborates closely with these organizations to galvanize industry-wide participation, encourage the implementation of sustainable practices, and promote technological innovation. By leveraging their networks and expertise, the project fosters collective action, enabling the blue economy to thrive while aligning with sustainability and environmental conservation imperatives. Together, coastal communities and industry associations form the cornerstone of SEAQUEST's mission, ensuring a holistic and inclusive approach to addressing the region's challenges and opportunities.

Accordingly, media and communication channels are indispensable in amplifying the outreach and impact of SEAQUEST. Regional media outlets, digital platforms, and social media networks serve as dynamic conduits for disseminating the project's objectives, milestones, and outcomes to a diverse audience. These channels are instrumental in raising public awareness, cultivating a shared understanding of the blue economy's significance, and inspiring collective action toward sustainable practices. SEAQUEST strategically leverages these platforms to share success stories, highlight innovative solutions, and foster knowledge exchange across borders.

By promoting transparent and compelling narratives, the project not only engages stakeholders but also generates momentum for broader societal support and behavioral change within the region.

Essentially, the careful identification and meaningful engagement of key stakeholders lie at the heart of SEAQUEST's mission. By incorporating a wide spectrum of participants—including local authorities, small and medium enterprises, academic institutions, non-governmental organizations, youth organizations, policymaking bodies, coastal communities, industry associations, and media partners—the project creates an inclusive and interconnected framework.

This collaborative network ensures that SEAQUEST's initiatives are not only practical and impactful but also aligned with regional needs and international strategic priorities. Through this integrated and participatory approach, SEAQUEST contributes significantly to the sustainable development of the Black Sea Basin, fostering long-term economic growth, environmental stewardship, and social cohesion across the region.

3.1.1. Enterprises and Industry Associations

The sea has always been a fundamental part of human civilization, providing food, a means of transport, and a platform for trade that has allowed societies to grow and thrive. Historically, human activity at sea was mostly confined to shallow coastal regions, with only the most accessible parts of the sea being utilized. However, the rapid advancement of technology over the past few decades has enabled humans to reach even the most remote and unexplored regions of the sea. This expanded access has opened up new opportunities, driven by the increasing commercial interest in the sea, as land-based resources become fully exploited or exhausted. As the global population grows and consumption rates increase, the demand for resources and the potential of the sea have surged.

One of the notable developments is the rising interest in commercial deep-sea mining, which is now not only considered technologically feasible but also imminent. Additionally, the search for novel bioactive compounds to combat antimicrobial resistance is increasingly focusing on microorganisms found in the deep sea, an area once considered out of reach.



Moreover, with growing space constraints on land, there has been a significant push toward large-scale offshore wind farms and deep-water installations, providing renewable energy and contributing to the diversification of the energy sector.

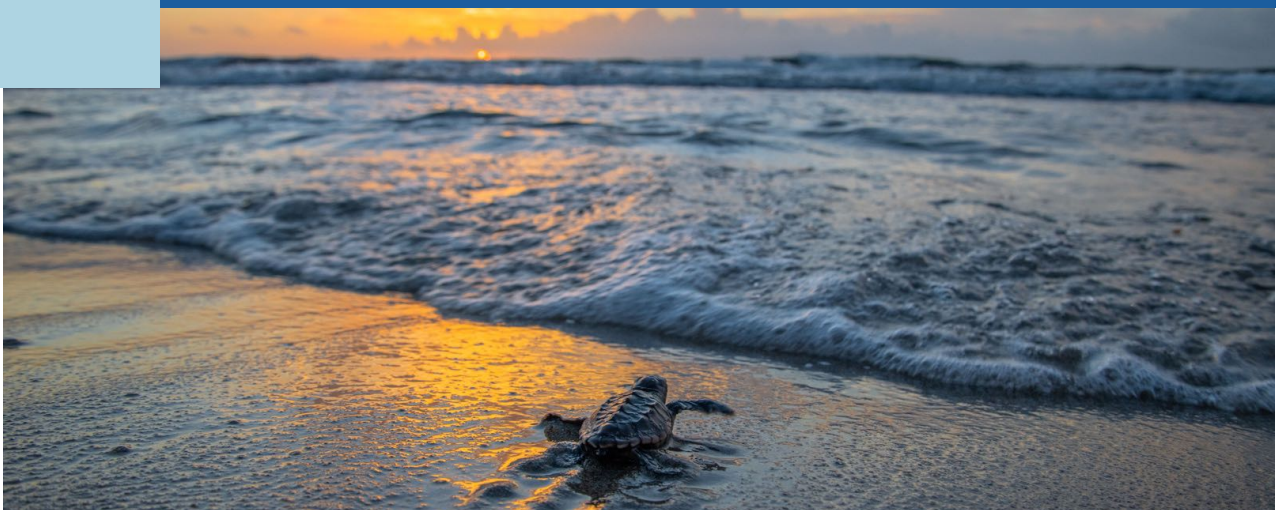
This recognition of the sea as a vast and largely untapped economic frontier, covering more than two-thirds of the Earth's surface, has led to substantial investments aimed at unlocking its potential. Industries spanning a diverse range of sectors, such as fisheries, aquaculture, marine energy, and coastal tourism, are witnessing significant growth. At the same time, the sea is also seen as essential in addressing broader environmental and societal challenges, especially in relation to climate change, biodiversity loss, and sustainable resource management. However, these opportunities come with significant environmental and governance challenges.

The industrialization of the sea has placed unprecedented pressure on marine ecosystems, which, combined with the accelerating effects of climate change, has led to widespread concerns about the long-term health of the sea. Issues such as ocean acidification, marine heatwaves, plastic pollution, and disrupted ecological connectivity are having a profound impact on marine life. These challenges, which transcend political boundaries, have brought attention to the need for international cooperation and sustainable governance to protect marine resources.

The concept of a "blue economy" — one that combines economic growth with environmental sustainability — is now gaining traction in national and international policy circles. However, the blue economy is being interpreted in a variety of ways, and there are debates over its scope, goals, and the groups it should benefit. This has led to calls for exploration before exploitation, emphasizing the need to understand the long-term environmental impact of human activity at sea before fully exploiting its potential. At the same time, the sea's role in achieving the United Nations' climate and development goals is becoming increasingly important.

In this complex and rapidly changing landscape, enterprises and industry associations are essential in shaping the blue economy, particularly in regions like the Black Sea. These stakeholders are not just passive participants; they are key agents of change, innovation, and sustainability. In the context of the SEAQUEST project, which is dedicated to fostering a competitive, sustainable, and integrated blue economy, enterprises and industry associations play an integral role in achieving the project's objectives. Their participation ensures that the outcomes of SEAQUEST are not only effective but also deeply embedded in the local economic and social fabric.

The Blue Economy sectors in the Black Sea region, such as fisheries, maritime transport, marine energy, and coastal tourism, are central to the economic activity of coastal communities and the broader regional economy. These sectors not only contribute significantly to the region's GDP but also influence the livelihoods of millions of people.



However, these industries face unique challenges. The need to implement sustainable practices, adopt innovative technologies, and navigate complex regulatory landscapes is paramount. For small and medium-sized enterprises (SMEs) in particular, limited resources often restrict their ability to invest in new technologies, adopt sustainable practices, and stay competitive in an increasingly globalized market.

SEAQUEST acknowledges these challenges and strives to provide a platform for enterprises to access the tools, resources, and knowledge they need to overcome them. By fostering an environment of collaboration, SEAQUEST enables businesses to improve their operational efficiency and sustainability. The project supports the introduction of cutting-edge technologies, such as advanced data analytics, artificial intelligence, and remote sensing, which can significantly enhance productivity while minimizing environmental impact. These innovations can help businesses in the blue economy sector not only increase profitability but also make strides in adopting cleaner production methods, reducing emissions, and integrating eco-innovations.

Moreover, SEAQUEST offers capacity-building programs, training sessions, and the dissemination of best practices, which help businesses comply with environmental regulations, improve their competitiveness, and secure long-term sustainability. The project's holistic approach ensures that all stakeholders in the blue economy, from small family-run enterprises to large multinational corporations, have access to the knowledge and resources they need to thrive in a rapidly evolving and environmentally conscious market.

In parallel with enterprises, industry associations are instrumental in driving the blue economy forward in the Black Sea region. Representing the collective interests of businesses across various sectors, these associations act as vital catalysts for cooperation, ensuring that businesses have a voice in the policy-making process. They advocate for the creation of regulations that support sustainable practices while promoting the interests of their members. Furthermore, industry associations serve as hubs for knowledge exchange, fostering collaboration and the horizontal integration of sustainable practices across sectors.

The SEAQUEST project recognizes the essential role of industry associations in advancing sustainable development. By engaging closely with these associations, SEAQUEST ensures that its interventions are grounded in the practical realities of the blue economy. These partnerships enable the project to leverage the expertise, networks, and influence of industry associations, which in turn enhances its ability to advocate for policy changes that support sustainable practices. Industry associations not only represent businesses but also serve as intermediaries between enterprises, regulatory bodies, and other stakeholders, ensuring that policies are aligned with the needs of the industry.

Furthermore, the involvement of industry associations enhances the visibility and impact of SEAQUEST. These associations have established relationships with key stakeholders, including government agencies, research institutions, and environmental organizations, enabling the project to engage a broader audience. This helps amplify SEAQUEST's message of sustainable development, positioning the blue economy not only as a significant economic sector but as a crucial element in regional and global environmental governance.

In essence, the active involvement of enterprises and industry associations is vital for the success of the SEAQUEST project and for the development of a sustainable blue economy. These stakeholders are co-creators of the vision for a prosperous and environmentally responsible blue economy. Their commitment to innovation, sustainable practices, and collaboration is essential for ensuring that SEAQUEST's outcomes align with both regional and global sustainability goals. By harnessing the strengths of these stakeholders, SEAQUEST is able to foster a resilient, competitive, and inclusive blue economy that not only ensures the economic vitality of the Black Sea region but also contributes to the long-term health and sustainability of the sea. This collaboration provides a model for sustainable development that can be applied to other regions, ensuring that the blue economy can thrive while safeguarding the marine ecosystems on which it depends.

3.1.2. Youth Organizations

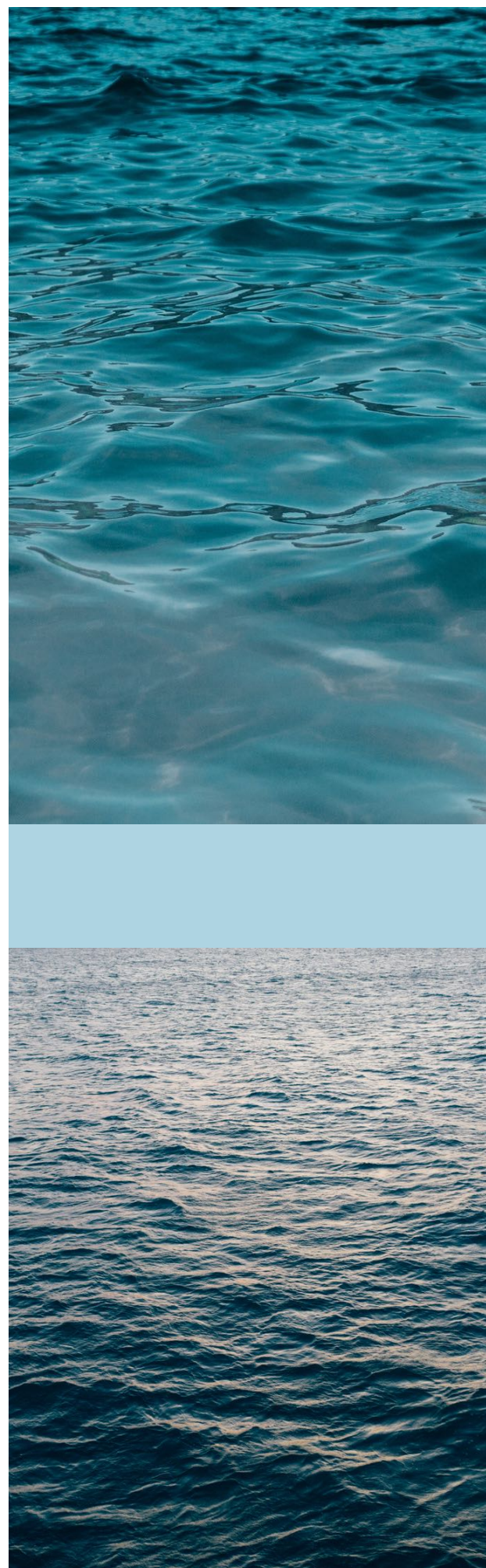
Youth organizations play a pivotal role in the development of a sustainable and integrated Blue Economy, particularly within the context of the Black Sea region. As the intersection of environmental sustainability and economic growth in marine industries grows more complex, these organizations provide critical innovation, education, and advocacy. The Blue Economy refers to the sustainable use of sea resources for economic development, job creation, and improved livelihoods, while ensuring the health of sea ecosystems. Given their ability to foster creativity and long-term environmental stewardship, youth organizations are uniquely positioned to drive this transition toward a more sustainable and equitable sea economy.

The SEAQUEST project recognizes the vital role of youth organizations in shaping a competitive and sustainable Blue Economy. By engaging young people in initiatives focused on marine resource management, innovation in sea-based industries, and policy advocacy, youth organizations are crucial agents of change. They offer a platform for young people to influence policy, integrate sustainability into economic practices, and acquire the knowledge and skills necessary to contribute to the evolution of a sustainable Blue Economy.

Education and capacity-building are among the primary contributions of youth organizations to the Blue Economy. Through non-formal education programs, workshops, and training opportunities, they provide young people with the technical skills and critical thinking required to address the challenges of the Blue Economy. These organizations promote an understanding of sea ecosystems, sustainable fisheries, marine energy, and pollution reduction. In doing so, they enable young people to engage with experts, entrepreneurs, and policymakers, facilitating the co-creation of innovative solutions that can drive positive change at both the local and regional levels.

Youth organizations also play a crucial role in empowering young people to become leaders and advocates for sustainability within their communities. By supporting youth-led initiatives focusing on marine conservation, sustainable fisheries, waste management, and blue tech innovations, these organizations help young people take ownership of their future. This sense of responsibility not only deepens their connection to the marine environment but also nurtures a generation of environmentally conscious leaders who can spearhead transformative changes in the Blue Economy.

Furthermore, youth organizations are often at the forefront of advocating for policy reforms that align with sustainable Blue Economy principles.



They engage in national and international dialogues, pushing for policies that integrate sustainability and equity into economic planning. By fostering intergenerational dialogue, they ensure that the voices of young people are heard in decision-making processes, influencing the development of regulations that protect marine ecosystems, promote responsible industries, and create green jobs.

In the specific context of the SEAQUEST project, youth organizations are key partners in achieving the project's objectives. SEAQUEST aims to foster a competitive and sustainable Blue Economy by integrating innovation, sustainability, and regional cooperation. Youth organizations contribute by engaging young people in the project's activities, ensuring active participation in research, capacity-building efforts, and the implementation of innovative solutions. These organizations serve as mediators between the academic, governmental, and private sectors, facilitating cooperation and bridging gaps in knowledge and action.

In line with SEAQUEST's commitment to inclusivity, youth organizations also ensure that marginalized youth, who are often excluded from decision-making processes and disproportionately affected by environmental degradation and economic disparities, are represented. Through grassroots connections and inclusive programming, these organizations offer pathways for education, entrepreneurship, and engagement, ensuring that these youth have a voice in the transformation of the Blue Economy. This inclusive approach is essential in building a more equitable sea economy, where economic opportunities are accessible to all.

Moreover, youth organizations are increasingly developing and promoting digital tools and platforms to support sustainable marine practices. With the rise of digital technology, these organizations can bridge the gap between science, policy, and practice. Through data analytics, social media, and digital storytelling, youth organizations raise awareness about marine sustainability and foster networks for collaboration and knowledge-sharing. These platforms enable young people to engage with real-time data, connect with stakeholders, and advocate for policies that prioritize the health of the seas.

While the SEAQUEST project champions the transformative potential of the Blue Economy, it also recognizes the risks associated with unchecked ocean development, which can lead to significant social and environmental injustices. The dominant discourse surrounding blue growth often overlooks the uneven distribution of benefits and potential harms to coastal communities, particularly marginalized groups. Civil society organizations and academics have highlighted the social justice implications of rapid and unregulated sea development, identifying risks such as displacement, environmental degradation, inequitable economic benefits, and the marginalization of women and Indigenous communities.

Youth organizations, as key advocates for social justice, are critical in ensuring that blue growth respects the rights and needs of vulnerable populations. They advocate for policies that address these injustices and promote "blue justice," which incorporates recognition, procedural fairness, and the equitable distribution of benefits. By engaging in dialogues on policy reforms and advocating for sustainable development practices, youth organizations can ensure that the benefits of the Blue Economy are shared more equitably, while minimizing negative impacts on marginalized communities.

Concluding, youth organizations are essential actors in the development of a sustainable and inclusive Blue Economy, particularly in the context of the SEAQUEST project. Their involvement in education, innovation, policy advocacy, and youth empowerment is central to achieving the long-term goals of a Blue Economy that benefits both people and the planet. By fostering an inclusive, collaborative, and dynamic environment for young people, youth organizations contribute significantly to the sustainable management of sea resources and the creation of green jobs. The SEAQUEST project stands as a model for the active involvement of youth organizations in shaping the future of the Blue Economy, providing a framework for continued collaboration, innovation, and sustainability, while ensuring that the voices of marginalized groups are heard and their rights respected.

3.1.3. Regional Authorities

In the context of the Blue Economy, regional authorities play a pivotal role in shaping and guiding sustainable development within their coastal and maritime territories. The Blue Economy encompasses a diverse range of sectors such as marine resource management, sustainable fisheries, renewable energy, coastal tourism, and marine biotechnology. As such, the involvement of regional authorities is crucial to balance economic growth with environmental preservation. These authorities have the unique capacity to act as intermediaries between national policies and local communities, ensuring that the principles of sustainability and equity are firmly integrated into regional economic activities.

Regional authorities, due to their proximity to both local ecosystems and industries, are particularly well-positioned to create and implement policies that drive sustainable practices across maritime and coastal sectors. These authorities are crucial in assessing the specific needs and challenges faced by their communities, including the impact of climate change, overfishing, and habitat degradation. By engaging in comprehensive environmental planning, regional authorities can ensure that development projects, whether they involve infrastructure, fisheries, or energy, align with the sustainable use of marine resources. This includes supporting green technologies, promoting the transition to renewable energy sources like offshore wind and tidal energy, and protecting marine biodiversity from the impacts of unsustainable practices.

Furthermore, regional authorities play a critical role in establishing frameworks for effective governance and fostering intersectoral cooperation. The successful implementation of the Blue Economy hinges on collaboration between multiple levels of government, private sector actors, research institutions, and civil society organizations.

Regional authorities, by acting as conveners, can bring together stakeholders to address complex issues such as marine pollution, the management of protected marine areas, and the sustainable development of fisheries. Through projects like SEAQUEST, regional authorities can contribute to the development of a collaborative ecosystem that fosters innovation, knowledge-sharing, and the exchange of best practices. This collective action will ensure the sustainable growth of the Blue Economy at local and regional levels.

Another key responsibility of regional authorities within the Blue Economy is capacity building and education. Investing in workforce development, particularly for marginalized communities, is essential to equip young people with the skills needed to engage in and benefit from Blue Economy sectors. Regional authorities can play a pivotal role by forming partnerships with educational institutions, research centers, and youth organizations to develop curricula and training programs that focus on marine science, environmental stewardship, sustainable business practices, and entrepreneurship. These initiatives will not only contribute to local economic development but also ensure that the workforce is equipped to meet the demands of emerging sectors within the Blue Economy.

As the Blue Economy continues to expand, regional authorities must also advocate for policy reforms that uphold the principles of Blue Justice. It is crucial that the benefits of economic growth are distributed equitably, ensuring that vulnerable communities are not left behind or disproportionately impacted by development activities. Through active dialogue with local populations, NGOs, and community leaders, regional authorities can ensure that the voices of those most affected by maritime changes are heard. They can advocate for policies that protect the rights of small-scale fishers, promote social inclusion, and prevent environmental degradation from undermining the long-term viability of coastal communities.

The SEAQUEST project provides an ideal framework for regional authorities to drive these efforts, as it focuses on fostering innovation, sustainability, and regional cooperation.

By supporting initiatives that prioritize sustainable marine resource management, clean technologies, and inclusive decision-making processes, regional authorities can help translate the principles of the Blue Economy into concrete actions. This collaborative effort will bridge gaps in knowledge, facilitate the exchange of expertise, and promote a regional approach to marine resource management that is economically viable and environmentally responsible.

In parallel with regional efforts to strengthen the Blue Economy, regional cooperation remains a critical factor in broader geopolitical contexts, such as in the Black Sea region. The Black Sea area, with its unique economic and strategic importance, offers significant potential for growth and development, but only through robust regional cooperation can these opportunities be fully realized. Organizations like the Black Sea Economic Cooperation (BSEC) reflect the growing interest in strengthening ties within this region, even though challenges related to historical political influences and transitional economies persist. The BSEC, although crucial for high-level coordination, has faced difficulties in implementing practical projects due to institutional weaknesses. As a result, while BSEC plays an essential role in political summits, its impact on day-to-day operations and project implementation has been limited.

Regional cooperation in the Black Sea region is not only about economic development but also about ensuring security, environmental sustainability, and mutual respect for the diverse interests of the involved countries. The establishment of cooperative frameworks within sectors such as energy, trade, shipping, and ecology is paramount. Through joint ventures and strategic partnerships, countries in the Black Sea region can unlock their economic potential and contribute to a more integrated and prosperous European and Eurasian corridor.

For regional cooperation to succeed, there are three core prerequisites: first, institutional capacity at both the national and regional levels; second, a commitment to mutual benefit strategies, where no single player seeks to dominate or pursue a zero-sum approach; and third, an open dynamic that allows for partnerships with the European Union (EU) and other neighboring regions like the Caspian, Central Asia, and the Middle East. The EU's involvement in the Black Sea region, through initiatives such as the European Neighbourhood Policy and the Eastern Partnership, provides both a model and a support structure for the countries of this region. The EU has been instrumental in promoting regional cooperation and offering assistance in institutional development, energy security, and environmental protection.

Europe's role extends beyond institutional development, as it also offers tools for fostering economic cooperation, reducing energy monopolies, and enhancing security. For example, EU collaboration with Black Sea countries in energy projects has contributed to securing stable energy flows from the region to Europe, with joint efforts aimed at balancing competition between projects like the Nabucco and South Stream pipelines. Additionally, the EU plays a key role in strengthening regional governance by helping to institutionalize cooperation in areas such as maritime security, sustainable fishing practices, and environmental monitoring.

Moreover, the EU's strategic interests align with the goals of Blue Economy development, as both seek to promote sustainable growth, environmental conservation, and social inclusion. By supporting regional authorities in building capacity, developing modern institutional frameworks, and enhancing education and training in marine sciences and environmental stewardship, the EU can help foster a more resilient and sustainable Blue Economy in the Black Sea region. This multi-faceted approach ensures that as the region transitions toward a more integrated and sustainable economy, both local communities and regional authorities will be equipped to thrive in a rapidly changing global environment.

Essentially, the cooperation between regional authorities in the Black Sea and broader Blue Economy efforts is essential for driving sustainable development, environmental protection, and economic growth.



Whether through fostering innovation, supporting capacity-building initiatives, or engaging in cross-border partnerships, regional authorities serve as key players in ensuring the successful transition to a sustainable Blue Economy. By integrating local and regional efforts with broader geopolitical and economic frameworks, regional authorities can not only shape the future of the Blue Economy but also contribute to global efforts for sustainability, equity, and prosperity in coastal and maritime regions worldwide.

3.1.4. Research Institutions

Research institutions play a crucial role in advancing the principles of the Blue Economy, providing the scientific foundation necessary for sustainable development in coastal and maritime sectors. As the world increasingly turns to the Blue Economy for economic growth, innovation, and environmental sustainability, these institutions are positioned as key actors in driving evidence-based policies, technological innovations, and capacity-building efforts. In the context of projects like SEAQUEST, research institutions contribute by generating cutting-edge knowledge, conducting interdisciplinary research, and developing solutions that address both environmental and socio-economic challenges associated with maritime industries.

At the core of their role, research institutions are instrumental in advancing scientific understanding of marine ecosystems, the sustainable use of sea resources, and the impacts of climate change on the marine environment. Through rigorous scientific research, these institutions provide critical insights into the health of marine ecosystems, biodiversity conservation, and the long-term sustainability of fisheries, coastal zones, and marine renewable energy. This scientific knowledge forms the basis for the development of sound policies and strategies for Blue Economy sectors, ensuring that growth is not pursued at the expense of environmental health. For instance, in SEAQUEST, research institutions are essential in identifying the key drivers of environmental degradation and developing integrated management practices that promote resilience in marine ecosystems.

Moreover, research institutions in the context of the Blue Economy also play a pivotal role in technological innovation and the development of green technologies. They are key players in advancing marine biotechnology, offshore renewable energy technologies (such as wind, wave, and tidal power), and sustainable shipping practices. By fostering collaboration between academia, industry, and government, research institutions drive the technological advances that are critical to the sustainable growth of Blue Economy sectors.

In the SEAQUEST project, for example, research institutions contribute to the development and implementation of clean technologies in maritime industries, enhancing both their efficiency and environmental sustainability. These technological solutions are necessary to mitigate the environmental impact of sectors like shipping, fisheries, and oil extraction, all of which have the potential to harm marine ecosystems if not managed sustainably.

In addition to technological innovation, research institutions serve as knowledge hubs for capacity-building and education in Blue Economy-related fields. These institutions are responsible for training the next generation of marine scientists, engineers, policymakers, and entrepreneurs who will shape the future of the Blue Economy. By offering specialized training programs, workshops, and educational resources, research institutions ensure that there is a skilled workforce capable of meeting the demands of emerging Blue Economy sectors. In SEAQUEST, research institutions work closely with regional authorities and local communities to foster educational programs that provide essential skills in marine resource management, marine spatial planning, and the sustainable development of coastal industries. These efforts contribute to increasing awareness and fostering a culture of sustainability within coastal and maritime regions.

Furthermore, research institutions are pivotal in conducting interdisciplinary research that integrates the social, economic, and environmental dimensions of the Blue Economy. This approach is crucial for understanding the complex interactions between human activities and marine ecosystems, as well as the social and economic implications of Blue Economy initiatives. Research institutions in SEAQUEST, for example, engage in studies that explore the socio-economic impacts of sustainable marine industries on local communities, particularly those that are vulnerable or marginalized. They investigate the relationships between fishing communities, marine resource management policies, and broader socio-economic trends, helping to ensure that Blue Economy policies promote both environmental sustainability and social equity.

Research institutions also facilitate international collaboration and knowledge exchange, enabling the sharing of best practices and innovative solutions across borders. The global nature of marine challenges, such as sea pollution, overfishing, and climate change, necessitates cooperative efforts and the exchange of scientific data and technical expertise.



Research institutions involved in projects like SEAQUEST help connect scientists, policymakers, and industry leaders from different countries and regions, fostering international collaboration that accelerates progress toward shared Blue Economy goals. This collaboration is particularly important in the Black Sea region, where regional research initiatives can significantly enhance the understanding of marine environmental conditions and promote cross-border cooperation in areas like fisheries management, marine conservation, and the sustainable development of maritime industries.

In addition to their role in scientific research and innovation, research institutions are crucial in supporting evidence-based policy development and governance. The challenges faced by the Blue Economy require sound, data-driven decisions to ensure that economic activities are both productive and environmentally responsible. Research institutions provide the evidence necessary for policymakers to craft policies that balance economic growth with environmental protection, thereby contributing to the sustainable governance of marine resources. Through partnerships with governmental agencies, private sector actors, and international organizations, research institutions in SEAQUEST contribute to the development of effective regulatory frameworks and policies that guide the sustainable development of Blue Economy sectors.

Finally, research institutions in the context of the Blue Economy are key to promoting public awareness and engagement on marine sustainability issues. Through outreach activities, publications, and public engagement campaigns, they raise awareness of the importance of sea conservation and the potential of the Blue Economy to drive sustainable development. In SEAQUEST, research institutions collaborate with community organizations, local authorities, and NGOs to engage the public in discussions about the sustainable use of marine resources and the need for responsible governance. This engagement helps to build a broader understanding of the challenges and opportunities within the Blue Economy, fostering public support for policies that promote sustainability and equitable growth.

The Black Sea, often regarded as one of the most degraded seas in the world, presents unique challenges in terms of governance and environmental protection. Since the 1960s, the Black Sea has experienced severe environmental degradation, including eutrophication, chemical and oil pollution, loss of marine biodiversity, and significant habitat changes. Effective management of these environmental pressures requires regional cooperation among the coastal countries, but this cooperation has often been hindered by geopolitical tensions, fragmented governance, and institutional gaps. Despite the existence of frameworks such as the Bucharest Convention and the Black Sea Commission, regional collaboration has proven difficult, limiting the success of efforts to address transboundary environmental issues.



Research institutions play a vital role in overcoming these challenges by contributing to the development of cooperative frameworks and enhancing the scientific knowledge necessary for effective regional management. In the context of SEAQUEST, these institutions are instrumental in promoting the collaboration of Black Sea countries, helping to foster a more integrated approach to environmental governance. They contribute valuable research on the state of the marine environment, the impacts of human activities, and the social and economic effects of environmental degradation, thereby informing policy decisions that promote regional cooperation.

Furthermore, research institutions involved in the governance of the Black Sea help to identify the strengths and limitations of existing frameworks like the Black Sea Commission. They assess the collaborative dynamics among the member states and offer recommendations for improving the governance system, ensuring that it can better address the region's environmental challenges. In SEAQUEST, research institutions engage with stakeholders at all levels to strengthen these governance structures, ensuring that they are more effective in meeting their goals for environmental protection and the sustainable development of Blue Economy sectors.

In conclusion, research institutions are indispensable to the successful development and implementation of Blue Economy initiatives, particularly in regions like the Black Sea. Through their contributions to scientific research, technological innovation, capacity-building, and policy development, they play a central role in ensuring that Blue Economy sectors are environmentally sustainable, economically viable, and socially inclusive. By facilitating interdisciplinary research, promoting international collaboration, and driving public engagement, research institutions help shape the future of the Blue Economy, ensuring that it delivers long-term benefits for both people and the planet. Through efforts like SEAQUEST, these institutions contribute significantly to the rehabilitation and preservation of degraded marine environments, while also fostering sustainable economic growth in coastal and maritime regions.

3.2. Stakeholder Analysis

The Blue Economy, an approach that emphasizes the sustainable use of ocean and marine resources for economic growth, environmental health, and job creation, has gained global recognition as a transformative framework for fostering resilience in coastal and maritime regions. In the Black Sea, a geographically and politically complex region, the development of a Blue Economy requires a thorough understanding of the various stakeholders involved and the intricate relationships between them. The SEAQUEST project, which seeks to promote sustainable maritime practices in the Black Sea, relies heavily on stakeholder collaboration to ensure effective management of marine resources. This stakeholder analysis highlights the diverse roles of key actors in the region and underscores their interdependencies, essential for achieving the objectives of SEAQUEST.

The Blue Economy in the Black Sea Region

The Black Sea is an important semi-enclosed basin bordered by six countries—Bulgaria, Georgia, Romania, Russia, Turkey, and Ukraine. This strategic location makes the Black Sea a site of significant economic activity, including fisheries, shipping, offshore energy, and tourism. At the same time, the Black Sea faces numerous environmental challenges, such as eutrophication, overfishing, and pollution, all of which threaten its biodiversity and ecosystem services. As such, the Blue Economy is seen as an opportunity to address these challenges while promoting sustainable economic growth. However, effective Blue Economy implementation in the Black Sea is complex due to competing interests, insufficient governance structures, and the region's vulnerability to climate change.

For projects like SEAQUEST, which aim to introduce sustainable practices in the Black Sea's maritime sectors, an in-depth stakeholder analysis is crucial. This analysis helps identify the actors whose actions and policies can shape the future of the Black Sea's marine resources and ensures that SEAQUEST's initiatives align with the broader goals of sustainable development, regional cooperation, and ecosystem preservation.

Identifying Stakeholders in the Blue Economy of the Black Sea

To achieve the goals of SEAQUEST, it is essential to understand the roles and responsibilities of key stakeholders across different sectors. Stakeholders in the context of the Blue Economy can be broadly categorized into governmental bodies, research institutions, the private sector, local communities, civil society organizations, and international organizations. Each group plays a distinct role in the development, implementation, and monitoring of Blue Economy initiatives in the region.

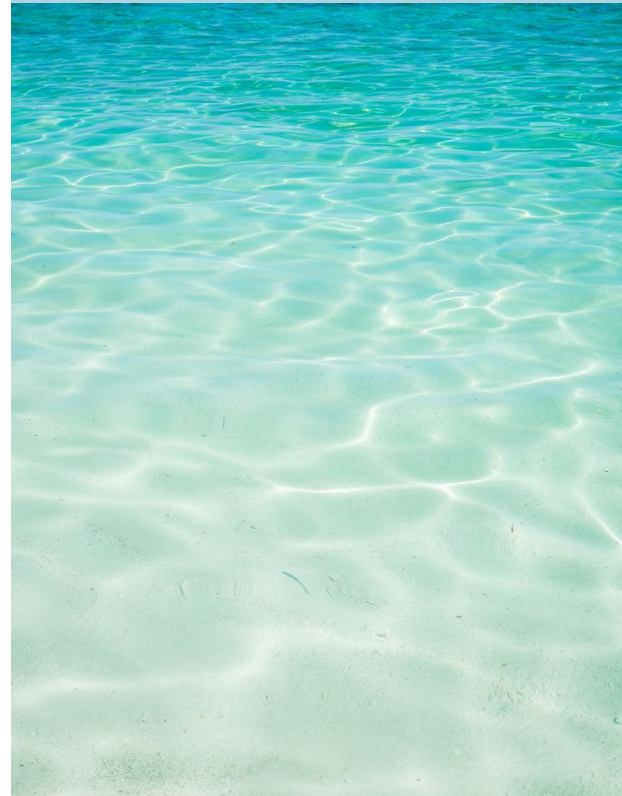
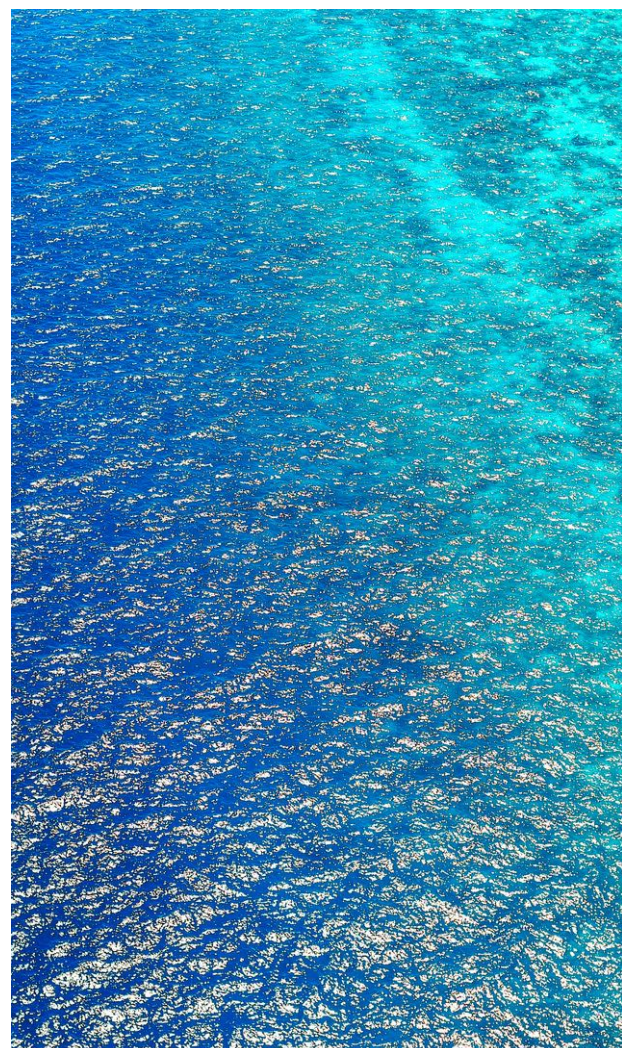
1. Governmental Bodies and Policymakers

Governmental bodies are central to the establishment and enforcement of policies and legal frameworks governing marine and coastal resource management in the Black Sea region. The role of national governments in the Blue Economy is multifaceted, involving policy formulation, regulatory oversight, and inter-governmental coordination. Governments are responsible for developing national Blue Economy strategies that harmonize with regional and international frameworks. In SEAQUEST, governmental stakeholders—ranging from ministries of environment, fisheries, and energy to local authorities—must collaborate to ensure that national and regional policies are aligned with the overarching goals of sustainable resource management.

The regional cooperation framework in the Black Sea is also vital. Bodies such as the Black Sea Economic Cooperation (BSEC) and the Black Sea Commission (BSC) facilitate cooperation among the six countries, aiming to strengthen regional policies on marine pollution, fisheries management, and environmental protection. For SEAQUEST, aligning with these regional frameworks ensures that Blue Economy activities are coordinated across national borders, helping address shared environmental challenges and promoting joint solutions to issues such as pollution control, resource depletion, and climate change adaptation.

2. Research Institutions and Academia

Research institutions and academic bodies are fundamental to understanding the current state of the Black Sea's ecosystems and resources, as well as to identifying opportunities for sustainable economic development. These institutions generate the scientific data needed to guide policy-making and the implementation of Blue Economy principles. Universities and research centers play a key role in SEAQUEST by conducting interdisciplinary research that addresses critical issues such as marine biodiversity conservation, the impacts of eutrophication, and the development of marine renewable energy sources.



Research plays a particularly crucial role in informing decision-makers about the ecological limits and carrying capacities of marine ecosystems in the Black Sea. For example, studies on fish stocks, marine pollution, and coastal habitat degradation provide valuable data that can be used to develop evidence-based policies for sustainable fisheries management. Furthermore, research institutions can lead the way in developing and promoting technological innovations, such as sustainable aquaculture techniques or renewable energy solutions, that can contribute to the Blue Economy.

The importance of knowledge transfer and capacity-building cannot be overstated in the context of SEAQUEST. Collaborative research initiatives between Black Sea countries and international institutions are vital for sharing best practices and scientific findings. This collaborative approach ensures that the most up-to-date, evidence-based strategies are applied to local and regional Blue Economy initiatives.

3.Private Sector and Industry

The private sector is a key driver of economic activities in the Black Sea, with industries such as shipping, fisheries, offshore energy, and tourism contributing significantly to the region's GDP. However, the maritime industries in the Black Sea also present challenges, particularly in relation to environmental sustainability. Overfishing, habitat destruction, marine pollution, and the carbon footprint of shipping and offshore energy extraction are among the issues that the private sector must address to contribute to a sustainable Blue Economy.

In SEAQUEST, private sector stakeholders, including shipping companies, fishing fleets, energy providers, and tourism operators, are crucial partners in adopting and promoting sustainable practices. For example, the shipping industry, one of the largest contributors to marine pollution in the Black Sea, has a critical role to play in adopting eco-friendly technologies and practices, such as cleaner fuels, waste management systems, and ballast water treatment systems. Similarly, the offshore energy sector must increasingly shift towards renewable energy solutions, such as offshore wind and tidal energy, to reduce the environmental impacts of traditional energy extraction.

The tourism sector in the Black Sea also holds significant potential for supporting the Blue Economy. By adopting sustainable tourism practices, such as eco-tourism and responsible coastal development, the tourism industry can create economic opportunities without compromising the marine environment. Private sector engagement in SEAQUEST is essential for demonstrating that sustainability and economic growth are not mutually exclusive but can be achieved through innovative and responsible practices.

4.Local Communities and Civil Society Organizations

Local communities, particularly those living along the Black Sea coast, are intimately connected to the region's marine resources. These communities rely on the sea for their livelihoods through fishing, agriculture, and coastal tourism. As such, they are directly impacted by the health of marine ecosystems and are key stakeholders in the Blue Economy. In SEAQUEST, local communities are not just passive recipients of Blue Economy benefits; they are active participants in the design and implementation of sustainable practices that affect their daily lives.

Civil society organizations, including environmental NGOs, advocacy groups, and local fishermen's associations, play a critical role in bridging the gap between governmental bodies and local communities. These organizations often serve as watchdogs, ensuring that policies are implemented in ways that protect both the environment and the social fabric of coastal communities. They also advocate for the inclusion of marginalized groups, such as small-scale fishermen, in decision-making processes, ensuring that the benefits of Blue Economy initiatives are distributed equitably.

The integration of local knowledge and practices into Blue Economy initiatives is vital for ensuring their long-term success. In SEAQUEST, this includes respecting traditional fishing practices, engaging in community-led conservation efforts, and promoting sustainable livelihoods that are closely tied to the health of the marine environment.

5. International Organizations and Regional Bodies

Given the transnational nature of the Black Sea's environmental and economic challenges, international organizations and regional bodies are integral to fostering collaboration across borders. Organizations such as the United Nations, the European Union, and the Global Environment Facility provide critical frameworks for international cooperation and funding, supporting the integration of Blue Economy principles at the regional level. These organizations also play a pivotal role in promoting policy coherence, setting environmental standards, and fostering cross-border collaboration.

The European Union, for instance, has been at the forefront of promoting the Blue Economy through its Blue Growth Initiative, which aims to support the sustainable growth of maritime sectors, including fisheries, marine biotechnology, and offshore renewable energy. For SEAQUEST, aligning with EU policies and utilizing EU funding mechanisms will be crucial for ensuring that Blue Economy initiatives in the Black Sea are well-supported and coordinated with broader European goals.

Regional bodies like the Black Sea Commission (BSC) and BSEC work to harmonize policies on environmental protection, sustainable fisheries, and marine pollution, ensuring that actions taken by individual countries are coordinated for the benefit of the entire region. Their support for SEAQUEST will be essential for fostering a cooperative regional approach to the Blue Economy.

Integrating Stakeholder Interests in SEAQUEST

Concluding, the success of the SEAQUEST project in promoting the Blue Economy in the Black Sea region hinges on the ability to engage a wide array of stakeholders in a collaborative, multi-level approach. Governments, research institutions, the private sector, local communities, civil society organizations, and international bodies must all play their part in developing and implementing strategies for sustainable resource use, marine conservation, and economic growth.

By conducting a thorough stakeholder analysis, SEAQUEST ensures that the interests and capabilities of each group are understood and leveraged, creating synergies that can drive meaningful progress toward a sustainable Blue Economy. A clear understanding of stakeholder roles not only helps mitigate conflicts but also promotes the alignment of policies, actions, and investments across the region, ultimately contributing to the long-term resilience of the Black Sea's marine environment and its coastal communities. Through this integrated approach, SEAQUEST aims to set a precedent for the sustainable use of marine resources in the Black Sea and beyond.

3.2.1. Roles and Influence

The concept of the Blue Economy, which seeks to foster sustainable economic development while preserving marine ecosystems, is of increasing relevance to the Black Sea region. With its diverse range of economic activities—ranging from fisheries and tourism to energy production and shipping—the Black Sea offers significant potential for the development of a sustainable Blue Economy. However, this potential can only be realized through the collaboration of various stakeholders, each of whom plays a crucial role in shaping the region's economic and environmental future.

The SEAQUEST project, focused on advancing sustainable practices in the Black Sea, directly engages with these stakeholders to align economic development with environmental conservation, ensuring a shared vision for the region's future. Understanding the roles, influences, and relationships between these stakeholders is essential to the success of SEAQUEST. This analysis explores the various stakeholders in the Black Sea region, with a particular emphasis on their role and influence in the context of the Blue Economy.

At the core of the Blue Economy in the Black Sea are the national governments of the bordering countries, including Bulgaria, Romania, Ukraine, Turkey, Georgia, and Russia. The influence of government actors in this context is undeniable. Governments set the legal, political, and regulatory frameworks that govern economic activity, resource management, and environmental protection.

Their policies and regulations directly influence the trajectory of Blue Economy initiatives by determining which activities are permitted, which are regulated, and which are incentivized. Governments are also responsible for the enforcement of environmental standards, allocation of resources for conservation and research, and for facilitating or hindering regional cooperation. For SEAQUEST, engaging with national governments is a primary avenue through which the project can influence policy and regulatory reforms that align with sustainable practices in the Black Sea. Governments hold the power to create incentives for the private sector to adopt cleaner technologies and more sustainable practices, as well as to enforce compliance with environmental protection laws. However, national political priorities often differ, with some countries prioritizing economic growth at the expense of environmental concerns. Navigating these differences and aligning national policies with the goals of the Blue Economy is a significant challenge for SEAQUEST, requiring a careful balance of diplomacy, evidence-based advocacy, and collaboration.

In addition to governmental actors, the private sector plays an influential role in the Blue Economy of the Black Sea. Key industries such as shipping, tourism, energy, and fisheries are central to the region's economic activity and contribute substantially to both national economies and regional trade. However, these industries also represent major sources of environmental pressure, particularly in terms of pollution, resource depletion, and habitat destruction. Shipping activities, in particular, contribute heavily to marine pollution, while the extraction of energy resources, including oil and gas, poses risks to the health of marine ecosystems. While these industries are significant contributors to economic development, their operations often conflict with the objectives of a sustainable Blue Economy.

The private sector's role, therefore, is twofold: it is both an economic driver and a potential source of environmental degradation. SEAQUEST's engagement with the private sector is critical in fostering a shift toward more sustainable practices. By advocating for cleaner technologies, sustainable fisheries management, and renewable energy alternatives, SEAQUEST seeks to leverage the private sector's economic influence to align business practices with Blue Economy principles. The private sector's power to invest in and adopt sustainable technologies, as well as its ability to shape public opinion through corporate social responsibility efforts, is a valuable asset. However, the challenge lies in overcoming the economic interests of industries that prioritize short-term financial gain over long-term environmental sustainability.

Academic and research institutions are another key stakeholder group that plays an essential role in advancing the Blue Economy in the Black Sea. These institutions are responsible for generating the scientific knowledge that underpins effective policy-making and sustainable economic practices. Research on the health of the Black Sea's marine ecosystems, the impact of human activity on biodiversity, and the effectiveness of different Blue Economy strategies is crucial for informed decision-making. Furthermore, academic institutions serve as innovation hubs, generating new technologies and solutions that can drive the transition toward a more sustainable Blue Economy.

In the case of SEAQUEST, collaboration with universities and research centers provides a foundation for evidence-based strategies and facilitates the development of new approaches to marine conservation and sustainable economic development. Research institutions also play a crucial role in educating the next generation of leaders, scientists, and policymakers, ensuring that future professionals are equipped with the knowledge and skills necessary to support the goals of the Blue Economy. The influence of academia lies not only in its capacity to generate and disseminate scientific knowledge but also in its role as a neutral and trusted advisor to policymakers and industry leaders. SEAQUEST benefits from the research capacity of academic institutions in advancing its goals and ensuring that the project's strategies are based on the most current and reliable scientific data.



Local communities and civil society organizations (CSOs) represent a grassroots level of influence in the Blue Economy. These stakeholders, often situated at the intersection of environmental degradation and economic development, are the most directly affected by changes in marine and coastal ecosystems. Local communities, particularly those dependent on the sea for their livelihoods, such as fishermen and coastal tourism operators, have a direct stake in the health of the Black Sea. Their knowledge of local ecosystems, coupled with their vulnerability to environmental changes, makes them crucial actors in the implementation of sustainable practices. Civil society organizations amplify the voices of local communities, advocating for the protection of the Black Sea's resources and promoting sustainable livelihoods.

These organizations often serve as intermediaries between local populations and government bodies, facilitating communication and ensuring that local concerns are incorporated into regional policies. For SEAQUEST, engaging with local communities and CSOs is essential in ensuring that the project aligns with local needs and realities. Local stakeholders bring invaluable knowledge of the region's environmental challenges and solutions, which can inform the design and implementation of the project's activities. Moreover, local communities and CSOs can play a crucial role in holding other stakeholders, such as governments and the private sector, accountable for their environmental commitments. Their influence lies in their ability to mobilize public support, raise awareness, and advocate for more sustainable policies and practices at both the local and regional levels.

International and regional organizations play an overarching role in coordinating efforts to promote the Blue Economy in the Black Sea. Institutions such as the United Nations (UN), the European Union (EU), and regional bodies like the Black Sea Commission and the Black Sea Economic Cooperation (BSEC) set the global and regional frameworks for sustainable development. These organizations provide a platform for cooperation among Black Sea countries, facilitating dialogue, policy alignment, and the development of common strategies for marine conservation and sustainable economic development.

They also serve as funding bodies, offering financial support for initiatives that align with their broader goals of sustainability, environmental protection, and economic development. The influence of international and regional organizations is substantial, as they have the capacity to shape the Blue Economy agenda through the establishment of binding agreements, the provision of technical assistance, and the allocation of funding.

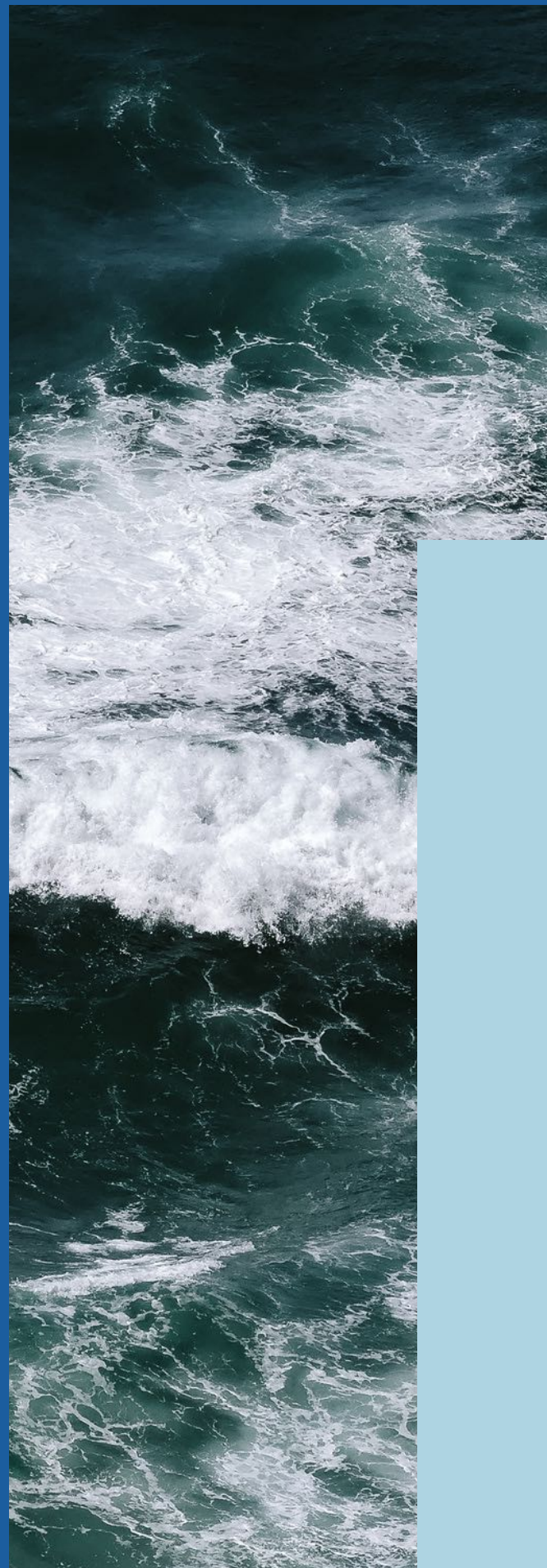
SEAQUEST's alignment with these organizations enhances its credibility, provides access to resources, and ensures that its goals are aligned with global and regional sustainability objectives. Through these partnerships, SEAQUEST is better positioned to influence policy changes and access the technical expertise necessary to implement successful Blue Economy initiatives in the Black Sea.

The Black Sea's unique geographical and geopolitical context adds an additional layer of complexity to stakeholder engagement. The region is home to a diverse set of countries with varying political systems, economic priorities, and environmental policies. This diversity can make cooperation challenging, as national interests may conflict with regional objectives. Furthermore, the political dynamics in the region are shaped by both historical factors and contemporary geopolitical tensions, which can complicate efforts to align stakeholders on common goals. For SEAQUEST, this means that successful project implementation requires not only technical expertise and scientific research but also a nuanced understanding of the political landscape. By fostering dialogue among stakeholders and promoting collaborative decision-making, SEAQUEST can help bridge these divides, ensuring that diverse interests are reconciled in pursuit of a shared vision for a sustainable Blue Economy.

Essentially, the stakeholders involved in the Blue Economy of the Black Sea region are diverse and multifaceted, each with distinct roles and varying levels of influence. Governments, the private sector, academic institutions, local communities, CSOs, and international organizations all play crucial parts in shaping the region's economic and environmental future. For the SEAQUEST project, understanding the roles, interests, and influences of these stakeholders is essential to fostering collaboration and achieving its objectives. By carefully managing stakeholder engagement and promoting cooperation across sectors and borders, SEAQUEST can contribute to the transition toward a more sustainable and prosperous Blue Economy in the Black Sea, ultimately ensuring the long-term health of its ecosystems and the well-being of its people.

3.2.2. Stakeholder Interconnections

The Black Sea region stands at a pivotal moment in its history, where the potential for economic prosperity through the Blue Economy is intricately tied to the sustainability of its marine and coastal ecosystems. The concept of the Blue Economy, which promotes the sustainable use of ocean and coastal resources for economic growth while preserving marine biodiversity, necessitates the integration of diverse stakeholders.

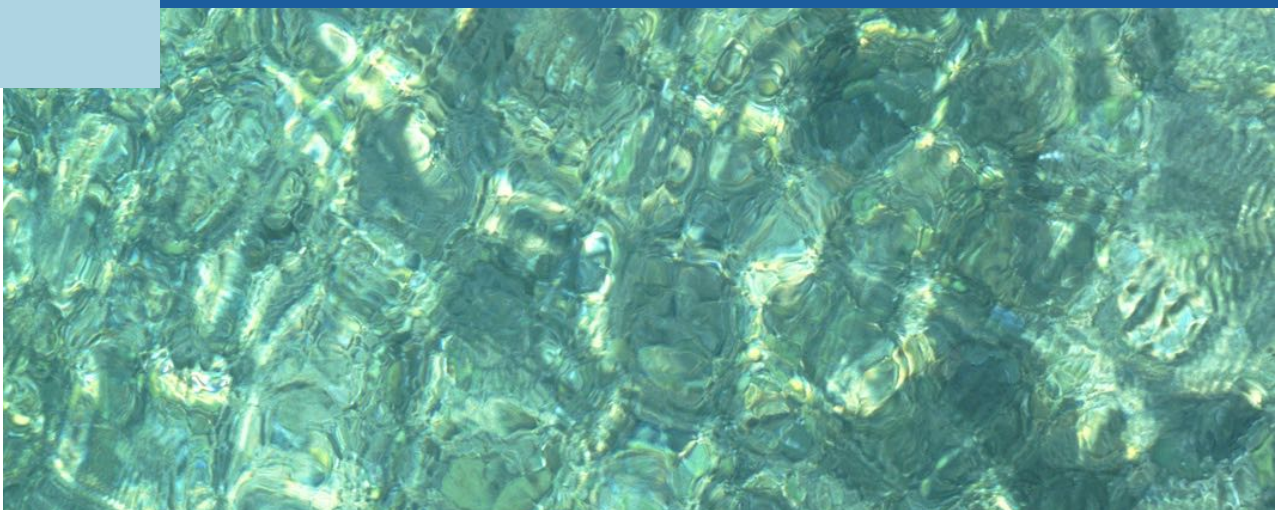


However, beyond mere stakeholder participation, the intricate web of interconnections between these actors forms the backbone of successful Blue Economy initiatives. Projects like SEAQUEST are uniquely positioned to act as catalysts for fostering and strengthening these interconnections, enabling collaborative solutions to the region's multifaceted challenges. This interconnected approach ensures the alignment of goals among stakeholders and enhances the region's capacity to leverage its natural and human resources effectively.

At the heart of the stakeholder network are national governments, which hold the dual responsibility of safeguarding marine ecosystems and facilitating economic development. Governments serve as the architects of regulatory frameworks, policies, and strategic plans that shape the region's Blue Economy. However, the influence of governments extends far beyond legislation. Their interconnections with international organizations, private industries, and local communities establish the foundation for cross-sector collaboration. For example, partnerships between national governments and international bodies, such as the European Union, the Black Sea Economic Cooperation (BSEC), and the United Nations, have facilitated the creation of region-wide agreements on sustainable fishing, pollution control, and marine spatial planning. These intergovernmental connections are instrumental in addressing transboundary issues that individual countries cannot resolve alone, such as marine litter and climate change impacts. Through SEAQUEST, these governmental interconnections are harnessed to create platforms for dialogue and coordinated action, ensuring that the interests of all nations in the Black Sea region are considered and balanced.

The private sector's role in the Blue Economy introduces both opportunities and complexities. Industries such as shipping, tourism, fisheries, and energy contribute significantly to the region's economic output but also pose challenges to its ecological health. The interconnections between private enterprises and other stakeholders are dynamic and often shaped by competing priorities. For instance, while the shipping industry drives regional trade and connectivity, it is also a major contributor to marine pollution and greenhouse gas emissions. Similarly, the tourism sector generates substantial economic benefits but can lead to the degradation of coastal ecosystems if not managed sustainably. SEAQUEST facilitates interactions between private sector actors and other stakeholders, encouraging industries to adopt environmentally responsible practices. This includes promoting investments in green technologies, such as low-emission shipping fuels and renewable energy projects, and fostering collaborations between businesses and research institutions to develop innovative solutions. The influence of the private sector is amplified when it aligns its operations with broader sustainability goals, and SEAQUEST actively works to create pathways for such alignment through targeted engagement and partnerships.

The scientific and academic community serves as the knowledge hub of the stakeholder network, providing the evidence base necessary for informed decision-making. Research institutions and universities contribute not only through scientific discoveries but also by bridging the gap between theoretical knowledge and practical implementation.



Their interconnections with governments, private enterprises, and local communities enable the translation of complex research findings into actionable policies and technologies. In the Black Sea region, where ecological and socio-economic dynamics are deeply intertwined, the role of scientific stakeholders is particularly critical. Through SEAQUEST, collaborations with academic entities are designed to generate robust data on marine biodiversity, pollution trends, and climate resilience. These partnerships also extend to the development of capacity-building programs that equip local communities and industries with the skills needed to adopt sustainable practices. By fostering knowledge-sharing platforms, SEAQUEST ensures that scientific insights are integrated into the broader stakeholder network, driving innovation and enhancing the effectiveness of Blue Economy initiatives.

Local communities and civil society organizations (CSOs) are the lifeblood of the Blue Economy in the Black Sea region. Their intimate connection to the region's marine and coastal environments makes them both beneficiaries and stewards of sustainable development. Fishermen, coastal tourism operators, and indigenous knowledge holders are often the first to experience the effects of environmental degradation and the benefits of conservation efforts. The interconnections between local communities, CSOs, and higher-level stakeholders are essential for ensuring that grassroots perspectives inform regional and national policies. SEAQUEST plays a pivotal role in amplifying the voices of these stakeholders, creating mechanisms for their concerns and insights to be heard at decision-making tables. Furthermore, SEAQUEST facilitates partnerships between CSOs and larger organizations, enabling the mobilization of local knowledge and resources to address broader challenges. This bottom-up approach ensures that Blue Economy initiatives are not only scientifically and economically viable but also socially equitable and culturally sensitive.

International and regional organizations hold a unique position as facilitators of cross-border collaboration and providers of technical and financial support. Their influence lies in their ability to create frameworks that unify the diverse interests of Black Sea nations. For instance, the European Union's Blue Growth Strategy and the United Nations' Sustainable Development Goals (SDGs) provide a shared vision for the sustainable use of marine resources. SEAQUEST's interconnections with these organizations are instrumental in aligning its objectives with global and regional agendas, ensuring access to funding and expertise. These partnerships also foster knowledge exchange between countries, enabling the replication of successful practices and the adaptation of innovative solutions to local contexts. Through its engagement with international bodies, SEAQUEST contributes to building a regional identity for the Black Sea that is rooted in sustainability, resilience, and cooperation.

The influence of stakeholder interconnections extends beyond the implementation of specific initiatives to shape the overall trajectory of the Blue Economy in the Black Sea region. These connections facilitate the exchange of knowledge, resources, and technologies, creating a synergistic environment where the collective impact of stakeholders far exceeds the sum of their individual efforts. For SEAQUEST, the challenge lies in managing these interconnections to ensure that they remain productive and aligned with the project's goals. This involves fostering a culture of transparency, inclusivity, and mutual respect, where stakeholders feel empowered to contribute and collaborate. By building trust and promoting shared accountability, SEAQUEST enhances the resilience and adaptability of the stakeholder network, positioning the Black Sea region as a model for sustainable maritime development.

In essence, stakeholder interconnections are the cornerstone of the Blue Economy in the Black Sea region. The dynamic relationships between governments, industries, academic institutions, local communities, and international organizations create a foundation for sustainable development that balances economic growth with environmental stewardship. SEAQUEST's role in facilitating and strengthening these interconnections is critical for realizing the region's potential as a hub of innovation, sustainability, and prosperity. By leveraging the collective expertise, resources, and commitment of its stakeholder network, SEAQUEST aims to chart a new course for the Black Sea's Blue Economy—one that is inclusive, resilient, and prepared to meet the challenges of the future.

3.3. Understanding Stakeholder Needs and Priorities

The Black Sea region stands at a critical juncture, presenting a unique opportunity to harness the Blue Economy's transformative potential. This concept transcends traditional maritime activities, intertwining economic growth, environmental sustainability, and social equity to form a cohesive strategy for the sustainable use of marine and coastal resources. However, realizing this vision requires a comprehensive understanding of the multifaceted and interdependent needs of stakeholders. Governments, private industries, local communities, scientific institutions, and international organizations each bring distinct perspectives and priorities to the table, making stakeholder interconnections a cornerstone of success. The SEAQUEST project emerges as a vital platform in this context, fostering cooperation, bridging gaps, and crafting inclusive strategies that address these priorities holistically while driving sustainable development in the region.

Governments play a pivotal role as the architects of policy and regulation, seeking to balance the imperatives of economic advancement and environmental preservation. Their focus lies in creating robust legal frameworks that incentivize investments in sustainable maritime sectors, enhance regional collaboration, and meet global commitments, such as the Sustainable Development Goals (SDGs) and the European Union's Green Deal. However, national agendas, resource limitations, and political realities often create disparities in priorities among Black Sea countries. SEAQUEST acts as a mediator, providing a platform for dialogue that aligns national objectives with regional and international frameworks.

Additionally, SEAQUEST leverages the Black Sea Strategic Research and Innovation Agenda (SRIA) and its Implementation Plan (IP), which were developed collaboratively by regional experts and European marine institutions, to support governments in formulating evidence-based policies that harmonize economic growth with ecological stewardship.

The private sector, a driving force of the Blue Economy, is characterized by its diverse industries, including shipping, fisheries, aquaculture, tourism, and renewable energy. Each sector has unique operational requirements and sustainability challenges. Shipping, for instance, focuses on modernizing port infrastructure, enhancing navigational safety, and addressing transboundary pollution, while fisheries and aquaculture emphasize sustainable resource management and the adoption of innovative technologies to combat overexploitation.



Similarly, renewable energy developers prioritize regulatory certainty, fiscal incentives, and public acceptance to advance offshore wind farms and other renewable projects. SEAQUEST acts as a conduit between industry stakeholders, governments, and scientific institutions, promoting cross-sectoral collaboration that drives innovation and sustainability. By aligning industrial priorities with the Black Sea SRIA's ecosystem-based management principles, SEAQUEST fosters an environment where businesses can thrive while contributing to the region's ecological and social well-being.

Local communities and civil society organizations bring invaluable grassroots perspectives to the Blue Economy, emphasizing the importance of social equity, environmental protection, and cultural preservation. Coastal communities depend on the Black Sea's ecosystems for livelihoods, food security, and cultural identity, making them particularly vulnerable to changes in marine biodiversity and resource availability. Civil society organizations advocate for greater inclusivity, transparency, and accountability in decision-making processes. SEAQUEST prioritizes the inclusion of these voices by implementing participatory mechanisms that integrate traditional knowledge and local insights into project development and execution. Moreover, SEAQUEST's alignment with the Black Sea SRIA's bottom-up co-design approach ensures that community needs remain central to regional strategies. This not only strengthens social cohesion but also empowers communities to play an active role in safeguarding their environmental and economic futures.

Scientific and academic institutions serve as the backbone of innovation and evidence-based policymaking in the Blue Economy. Their priorities include access to research funding, data, and collaborative networks to address complex challenges such as marine pollution, climate change adaptation, and the conservation of biodiversity. The Black Sea SRIA and its IP provide a structured framework to facilitate transdisciplinary research and foster partnerships between academic institutions, industries, and policymakers. SEAQUEST amplifies these efforts by creating opportunities for joint problem-solving and knowledge exchange. By linking research outcomes with practical applications, SEAQUEST ensures that scientific advancements directly contribute to the sustainable management of marine and coastal resources, ultimately bridging the gap between theory and practice in the Blue Economy.

International and regional organizations, such as the European Union, the United Nations Development Programme (UNDP), and the Black Sea Economic Cooperation (BSEC), play a crucial role in fostering regional integration and addressing transboundary challenges. Their priorities include harmonizing regulatory frameworks, mobilizing financial resources, and promoting cross-border knowledge-sharing.

These organizations are also instrumental in tackling issues that require collective action, such as marine pollution, overfishing, and climate change impacts. SEAQUEST aligns with these priorities by serving as a regional platform for collaboration, leveraging international expertise, and mobilizing funding to implement projects that address the Black Sea's unique challenges. Through its partnerships, SEAQUEST not only ensures compliance with global standards but also enhances the region's capacity to contribute meaningfully to international Blue Economy initiatives.

The dynamic and interconnected nature of stakeholder needs underscores the importance of an integrated and adaptive approach to the Blue Economy. Environmental changes, such as rising sea levels and shifting marine biodiversity, introduce new challenges and opportunities that require stakeholders to remain flexible and collaborative.

Similarly, advancements in technology and evolving consumer preferences continuously reshape industrial priorities, necessitating innovative and forward-thinking strategies. SEAQUEST addresses these complexities by maintaining open channels of communication, fostering a culture of inclusivity, and ensuring that stakeholder priorities are continuously reassessed and integrated into its initiatives. The Black Sea SRIA and IP further strengthen this adaptive capacity, providing a long-term guide for regional innovation and governance that reflects the evolving needs of the Black Sea community.

In conclusion, understanding and addressing stakeholder needs and priorities is a fundamental requirement for advancing the Blue Economy in the Black Sea region. Through its inclusive and collaborative approach, SEAQUEST, in synergy with the Black Sea SRIA and its Implementation Plan, offers a comprehensive framework that aligns diverse stakeholder interests with sustainable maritime objectives. By fostering dialogue, building partnerships, and integrating cutting-edge scientific insights, SEAQUEST empowers stakeholders to contribute meaningfully to the region's ecological, economic, and social resilience. This holistic and adaptive model not only strengthens the Black Sea region's capacity to achieve its sustainability goals but also sets a precedent for other maritime regions seeking to unlock the full potential of the Blue Economy in a responsible and equitable manner.

3.4. Strategies for Stakeholder Engagement

Stakeholder engagement is a cornerstone of sustainable development within the Blue Economy, particularly in regions such as the Black Sea, where environmental concerns, economic aspirations, and social equity intersect in complex ways. The SEAQUEST project has identified stakeholder engagement as a foundational element for achieving its objectives, emphasizing the need for inclusive, transparent, and collaborative strategies. These efforts are tailored to address the unique challenges and opportunities of the Black Sea region, ensuring that the diverse array of stakeholders involved in the Blue Economy can contribute meaningfully to its sustainable growth.

A key priority for SEAQUEST is the establishment of participatory governance frameworks that empower stakeholders to take an active role in decision-making. The Black Sea region's ecological and socio-economic diversity requires governance models that are adaptive and inclusive, bringing together representatives from government, industry, local communities, scientific institutions, and international organizations. Multi-stakeholder platforms serve as vital spaces for dialogue and consensus-building, particularly in addressing transboundary challenges such as marine pollution, overfishing, and climate change. These platforms align with the principles outlined in the Black Sea Strategic Research and Innovation Agenda (SRIA) and its Implementation Plan, fostering co-design and co-creation of strategies that balance economic, environmental, and social objectives.

Capacity building is another pillar of SEAQUEST's stakeholder engagement strategy. Stakeholders across the Black Sea region often operate with varying levels of expertise, resources, and access to information, creating disparities that can hinder effective collaboration. SEAQUEST addresses this by organizing targeted training sessions, workshops, and knowledge-sharing events that equip stakeholders with the skills and tools needed to participate effectively. These efforts are complemented by the establishment of transnational knowledge networks that connect policymakers, researchers, and industry leaders. By promoting the exchange of best practices, cutting-edge research, and innovative technologies, these networks enable stakeholders to collectively address complex challenges and harness emerging opportunities in sectors such as sustainable aquaculture, renewable energy, and eco-tourism.

Inclusivity and equity are central to SEAQUEST's approach, ensuring that all voices are heard and valued in decision-making processes. Particular attention is given to underrepresented groups, including coastal communities, small-scale fishers, and civil society organizations, whose local knowledge and lived experiences are invaluable for shaping sustainable solutions. SEAQUEST employs participatory methodologies that integrate these perspectives into planning and policy development, recognizing the socio-economic and cultural diversity that defines the region. Moreover, efforts are made to remove barriers to participation, such as language differences and technological disparities, thereby fostering an environment where all stakeholders can engage meaningfully.

Technological innovation plays a pivotal role in SEAQUEST's stakeholder engagement efforts. Digital tools and platforms are leveraged to facilitate communication, streamline collaboration, and expand the reach of engagement initiatives. These technologies enable stakeholders from across the Black Sea region to connect and coordinate in real time, overcoming logistical and geographical challenges. Furthermore, data-driven approaches, including geospatial analysis and environmental monitoring systems, provide stakeholders with actionable insights that inform decision-making and enhance the effectiveness of engagement processes.

Cross-sectoral collaboration is another critical element of SEAQUEST's strategy. Recognizing the interconnected nature of the Blue Economy, the project promotes partnerships that bridge traditional divides between academia, industry, government, and civil society. This collaborative approach not only drives innovation but also ensures that stakeholders can address shared challenges more effectively. For instance, partnerships between research institutions and industry actors are being fostered to advance sustainable practices in maritime sectors, while collaboration with policymakers helps align national and regional priorities with broader sustainability goals.

Transparency and accountability are fundamental to SEAQUEST's engagement practices, ensuring that stakeholders trust the process and remain committed to its outcomes. Open communication channels are maintained to provide stakeholders with timely and accurate information about the project's objectives, activities, and results. Regular reporting, public consultations, and feedback mechanisms further reinforce these principles, creating a culture of mutual accountability. Stakeholders are encouraged to take ownership of their roles and responsibilities, contributing to the project's credibility and ethical integrity.

SEAQUEST's stakeholder engagement strategies are firmly rooted in the context of international and regional frameworks, aligning with initiatives such as the United Nations Sustainable Development Goals (SDGs) and the European Union's Green Deal. The project also integrates the priorities and objectives of the Black Sea SRIA, ensuring that its activities contribute to the larger vision of sustainable development for the region. This alignment not only enhances the coherence of SEAQUEST's efforts but also positions the Black Sea as a global leader in sustainable Blue Economy practices.

Through its integrated and adaptive approach to stakeholder engagement, SEAQUEST provides a robust framework for fostering collaboration, building capacity, and promoting inclusivity in the Black Sea region. By harmonizing stakeholder needs with sustainable development objectives, the project creates an enabling environment for the growth of a resilient and prosperous Blue Economy. This model of engagement, characterized by participatory governance, technological innovation, and cross-sectoral partnerships, offers valuable lessons for other regions seeking to balance economic growth with environmental stewardship and social equity.

3.4.1. Framework Development

The development of the Blue Economy in the Black Sea region necessitates a well-defined and adaptive framework that guides stakeholders in aligning their diverse objectives with principles of sustainability, inclusivity, and economic growth. The SEAQUEST project underscores the need for a multidimensional framework that integrates ecological, economic, and social considerations while fostering regional cooperation and leveraging scientific expertise. Such a framework is indispensable for navigating the complex interplay of stakeholder interests and ensuring the long-term resilience of the Black Sea's marine and coastal resources.



A foundational component of this framework is the establishment of a shared vision that aligns with international and regional policy frameworks, including the United Nations Sustainable Development Goals (SDGs), the European Union's Green Deal, and the Black Sea Strategic Research and Innovation Agenda (SRIA). This alignment ensures coherence between local actions and global sustainability objectives, enabling stakeholders to address transboundary challenges such as marine pollution, overfishing, and habitat degradation in a unified manner. SEAQUEST plays a critical role in facilitating this alignment by fostering dialogue among stakeholders and integrating scientific and technical insights into policy development processes.

An ecosystem-based management (EBM) approach is central to the framework, emphasizing the interconnectedness of natural systems and human activities. This holistic perspective requires stakeholders to account for the cumulative environmental impacts of their actions, prioritize the restoration of degraded ecosystems, and adopt sustainable resource management practices. SEAQUEST champions this approach by promoting evidence-based decision-making, underpinned by rigorous scientific research and advanced monitoring technologies. This enables stakeholders to develop adaptive strategies that balance ecological integrity with economic imperatives.

Stakeholder coordination is paramount in a region characterized by diverse interests and priorities across multiple sectors, including government, industry, academia, and civil society. The framework must facilitate multi-stakeholder collaboration through inclusive platforms that encourage dialogue, consensus-building, and the co-creation of innovative solutions. SEAQUEST supports the establishment of such platforms, creating opportunities for stakeholders to align their efforts, share knowledge, and address shared challenges. This collaborative approach reduces conflicts, fosters trust, and enhances the effectiveness of regional strategies.

Capacity building is another critical pillar of the framework, aimed at equipping stakeholders with the knowledge, skills, and tools necessary to engage meaningfully in the Blue Economy. SEAQUEST prioritizes tailored training programs and workshops that address key areas such as climate adaptation, sustainable fisheries management, renewable energy development, and green technology adoption. By fostering a culture of continuous learning and innovation, the framework ensures that stakeholders are well-prepared to adapt to emerging challenges and seize new opportunities within the Blue Economy.

Inclusivity and participatory processes are essential for ensuring that the framework reflects the diverse perspectives and priorities of all stakeholders, particularly those of local communities and marginalized groups. Coastal communities, for instance, hold valuable traditional knowledge and are deeply affected by changes in marine and coastal environments. SEAQUEST emphasizes the integration of these local insights through community-based monitoring, participatory planning, and co-design of policies and projects. Such approaches enhance the legitimacy and effectiveness of stakeholder actions while ensuring that the benefits of the Blue Economy are equitably distributed.

To ensure the effective implementation of the framework, mechanisms for monitoring, evaluation, and adaptive management must be incorporated. SEAQUEST advocates for the use of state-of-the-art tools such as geospatial analysis, environmental monitoring systems, and data-driven decision-making processes. These tools enable stakeholders to track progress, identify emerging risks, and make informed adjustments to their strategies. An adaptive management approach ensures that the framework remains flexible and responsive to dynamic environmental, economic, and social conditions.

Transparency and accountability form the bedrock of the framework's credibility and success. SEAQUEST promotes the adoption of robust accountability mechanisms, including independent audits, stakeholder reviews, and public reporting, to ensure that stakeholder actions are aligned with agreed-upon objectives and principles. Open communication and transparency foster trust among stakeholders and facilitate greater engagement from civil society and the public.

Regional integration is a critical dimension of the framework, given the transboundary nature of many challenges facing the Black Sea region. SEAQUEST leverages regional initiatives, such as the Black Sea SRIA Implementation Plan, to enhance coordination and harmonize stakeholder actions across national borders. By fostering cross-border collaboration and mobilizing financial and technical resources, the framework strengthens the region's collective capacity to address shared challenges and advance sustainable development goals.

Above all, the development of a stakeholder framework for the Blue Economy in the Black Sea region requires an integrated, science-driven, and participatory approach.



SEAQUEST's emphasis on ecosystem-based management, capacity building, inclusivity, and regional cooperation provides a robust foundation for such a framework. By aligning stakeholder actions with global and regional sustainability objectives, fostering innovation and collaboration, and ensuring transparency and accountability, the framework empowers stakeholders to contribute effectively to the sustainable development of the region. This model not only enhances the resilience of the Black Sea's ecosystems but also establishes a precedent for sustainable Blue Economy practices in other maritime regions globally.

3.4.2. Collaborative Approaches

The complexity of advancing the Blue Economy in the Black Sea region demands the adoption of collaborative approaches that unite stakeholders across sectors, geographies, and expertise. SEAQUEST, as a pivotal initiative, emphasizes the necessity of forging partnerships that address the interconnected ecological, economic, and social challenges of the region. By fostering collaboration among governments, industries, academia, civil society, and international organizations, SEAQUEST facilitates the design and implementation of sustainable and inclusive strategies, ensuring that stakeholder efforts contribute effectively to the region's Blue Economy objectives.

Central to effective collaboration is the principle of multi-stakeholder engagement, which emphasizes inclusivity, co-ownership, and participatory decision-making. Governments play a critical role as the architects of legal and institutional frameworks that facilitate collaboration. However, achieving coherence among diverse national priorities requires harmonized policies and strategies that address both regional and international commitments. SEAQUEST acts as a facilitator by organizing intergovernmental dialogues and promoting cross-border cooperation. This enables alignment with broader global frameworks such as the United Nations Sustainable Development Goals (SDGs), the European Union's Green Deal, and the Black Sea Strategic Research and Innovation Agenda (SRIA). Through this alignment, SEAQUEST helps ensure that the Black Sea region contributes to global sustainability efforts while addressing its unique challenges.

The engagement of industries and the private sector is essential to operationalize the Blue Economy. Maritime industries such as fisheries, aquaculture, shipping, tourism, and renewable energy development serve as critical engines of economic growth, yet each sector faces distinct sustainability challenges. Collaborative approaches foster inter-sectoral partnerships that address these challenges by integrating innovation and sustainability into business models.

For example, SEAQUEST facilitates partnerships between renewable energy developers and scientific institutions to advance green technology deployment, while collaboration with local communities ensures equitable benefit-sharing and public acceptance. By serving as an intermediary, SEAQUEST ensures that industrial priorities are aligned with environmental stewardship and social inclusivity.



Capacity building and knowledge-sharing initiatives form the backbone of collaborative approaches. The Black Sea region's stakeholders possess varying levels of expertise, resources, and institutional capacity, making it imperative to establish mechanisms that bridge these disparities. SEAQUEST prioritizes technical training, skills development, and the dissemination of best practices to enhance regional capabilities. Targeted workshops, policy briefs, and interactive forums create opportunities for stakeholders to learn from one another, fostering a culture of innovation and adaptability. By equipping stakeholders with the tools and expertise needed to navigate the complexities of the Blue Economy, SEAQUEST strengthens the collective resilience and capacity of the region.

Collaboration between scientific research institutions and local communities is another pivotal component of SEAQUEST's approach. Research entities contribute evidence-based insights that inform policy and practice, while local communities offer invaluable traditional knowledge and context-specific perspectives. This symbiotic relationship ensures that strategies are both scientifically rigorous and culturally attuned. SEAQUEST promotes the co-design of initiatives, participatory monitoring programs, and knowledge-exchange platforms that integrate these diverse knowledge streams. For example, collaborative research projects addressing marine pollution, climate adaptation, and sustainable fisheries management benefit from this multidimensional approach, enhancing the legitimacy and efficacy of stakeholder actions.

Transparency and trust-building are indispensable for fostering successful collaborations, particularly in a region characterized by diverse and, at times, competing interests. SEAQUEST places a strong emphasis on open communication, accountability, and the establishment of trust among stakeholders. Mechanisms such as public consultations, stakeholder dialogues, and transparent reporting frameworks create an environment where diverse voices are heard, conflicts are mitigated, and mutual understanding is fostered. By embedding these principles into its collaborative processes, SEAQUEST ensures that stakeholder efforts are cohesive and aligned with shared regional objectives.

Regional integration is crucial for addressing the transboundary nature of the Black Sea's ecological and economic challenges. SEAQUEST actively leverages platforms such as the Black Sea SRIA to promote coordinated actions among countries. Joint initiatives focusing on marine pollution control, biodiversity restoration, and climate resilience exemplify the value of cross-border collaboration. By engaging regional and international organizations, SEAQUEST amplifies the impact of these initiatives, mobilizing resources, expertise, and political will to drive transformative change. This approach ensures that the Black Sea region remains a key player in global Blue Economy strategies while addressing its unique regional needs.

Adaptive management underpins SEAQUEST's collaborative framework, ensuring that stakeholder strategies remain dynamic and responsive to emerging challenges. The rapidly evolving impacts of climate change, technological advancements, and socio-economic shifts necessitate flexible and iterative approaches. SEAQUEST supports the use of tools such as scenario planning, geospatial analysis, and environmental monitoring to guide stakeholders in refining their actions based on real-time data and changing conditions. This adaptability enhances the long-term effectiveness and resilience of collaborative efforts in the Blue Economy.

Finally, collaborative approaches are integral to the successful development of the Blue Economy in the Black Sea region. SEAQUEST's emphasis on multi-stakeholder engagement, inter-sectoral cooperation, capacity building, knowledge integration, and regional alignment provides a robust framework for achieving sustainable and equitable outcomes.

By fostering transparency, trust, and adaptability, SEAQUEST empowers stakeholders to address shared challenges and seize collective opportunities. This collaborative ethos not only strengthens the resilience of the Black Sea's ecosystems and communities but also positions the region as a global exemplar of sustainable maritime development.

4. COUNTRY- SPECIFIC ANALYSIS

4.1 Greece

4.1.1. Overview of the Blue Economy in Greece

The blue economy in Greece, encompassing all economic activities related to the oceans, seas, and coastal areas, plays a crucial role in the country's economy. This sector, which spans traditional industries like fisheries, maritime transport, and coastal tourism, as well as emerging fields such as blue biotechnology and ocean energy, contributes significantly to Greece's GDP and employment. The Greek blue economy is a key part of the broader EU Blue Economy, which shows steady growth and resilience, particularly after the economic challenges of the past decade.

Blue growth is increasingly becoming a central focus in European policy-making, expanding its significance beyond traditional maritime sectors to encompass new and rapidly developing industries that hold substantial potential for innovation. This paper aims to identify the key drivers of blue growth, using Greece as a case study. As the country enters a post-memorandum era, it faces the challenge of accelerating overall economic growth. This includes tapping into the untapped potential of its maritime economy, both at local and regional levels, and utilizing Marine Spatial Planning (MSP) as a tool to facilitate this growth.

To put forward concrete policy recommendations to boost and operationalize blue growth in Greece, a multi-actor approach was adopted. A field survey was conducted involving 24 "development companies" from across Greece, all operating at local and regional levels. The method used for this survey was environmental scanning, which included tools such as SWOT analysis to assess the current landscape. The survey results shed light on the strengths, weaknesses, opportunities, risks, and challenges facing blue growth in the Greek regional context, offering insights into the prospects and practical aspects of this emerging economic sector.

The findings of the primary research point to several key areas of strategy for promoting blue growth at the local level. These include:

1. **Balancing Marine Environment Protection and Economic Growth:** A key challenge is integrating ecosystem-based management to ensure that the protection of the marine environment does not hinder economic development, but rather supports sustainable growth in maritime sectors.
2. **Safeguarding Maritime Jobs:** As new industries emerge, it is crucial to preserve existing maritime jobs while creating new employment opportunities in innovative sectors like renewable energy, aquaculture, and maritime tourism.
3. **Promoting Entrepreneurial Discovery:** The Regional Strategy for Smart Specialisation offers a valuable framework to foster innovation and entrepreneurial discovery in the blue economy, encouraging the growth of new maritime businesses and technologies.
4. **Enforcement of Maritime Law:** Ensuring the proper enforcement of maritime laws is vital for the protection of resources, the safety of maritime activities, and the fair operation of industries within the blue economy.
5. **Promoting Biotechnology Research:** The maritime sector has significant potential for growth through biotechnology research, particularly in areas like marine biotechnology, which can lead to the development of new pharmaceuticals, food products, and environmentally friendly technologies.
6. **Creation of Maritime Clusters:** The establishment of maritime clusters can stimulate collaboration between businesses, research institutions, and government entities, creating synergies that drive innovation and strengthen the maritime economy.

Based on these findings, a series of policy proposals are put forward to support blue entrepreneurship, seen as a key component of Greece's new development model. These proposals include the creation of a more integrated and coordinated approach to maritime spatial planning, the development of incentives for maritime innovation and entrepreneurship, and the establishment of public-private partnerships to foster the growth of maritime clusters and boost the competitiveness of Greek maritime industries on a global scale.

In conclusion, blue growth represents a significant opportunity for Greece to strengthen its maritime economy, create jobs, and drive innovation. By implementing the proposed policies and fostering a more integrated approach to blue growth, Greece can harness the full potential of its maritime resources, ensuring sustainable development and long-term economic prosperity.

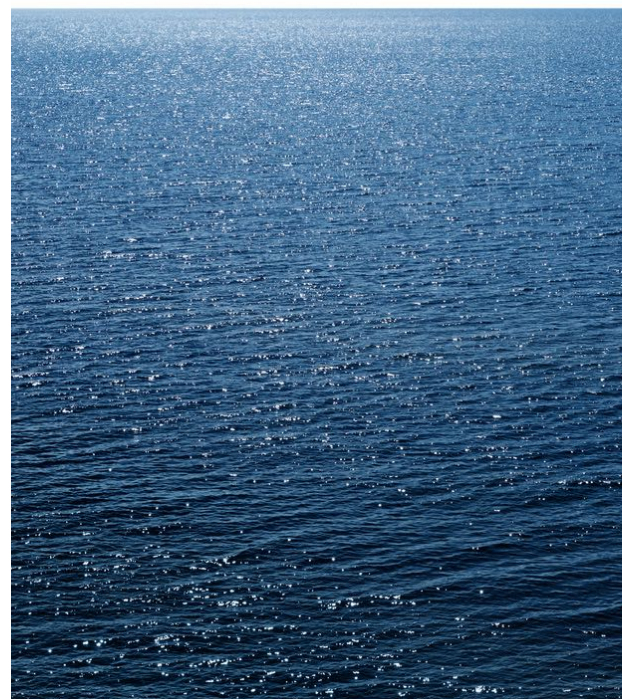
Economic Contribution

In 2021, Greece's blue economy employed approximately 446,000 people, accounting for 11.4% of the national workforce. This figure is a significant recovery from the 6.8% recorded in 2020, nearing pre-pandemic levels. The sector contributed €6.5 billion in gross value added (GVA), representing 4.1% of the country's total GVA. Although this marks an increase from the 2.3% contribution in 2020, it still falls short of the 5.5% share recorded in 2019, illustrating the ongoing effects of the pandemic on the economy.

The Greek blue economy's contribution to the national economy is predominantly driven by coastal tourism, which accounts for 83% of blue economy jobs and 67% of its GVA. This is a substantial increase from 2020 when coastal tourism represented 70% of employment in the sector. The Mediterranean's appeal, with destinations like Santorini and Mykonos, continues to make Greece one of Europe's top tourism hotspots. Maritime transport follows as the second largest contributor to both employment and GVA in the Greek blue economy, driven by the country's strategic position and its large fleet of ships. Marine living resources, which include fishing, contribute about 8% of employment, while other sectors, such as offshore energy and shipbuilding, provide smaller but still significant contributions.

Coastal Tourism: A Cornerstone of Greece's Blue Economy

Greece ranks fifth in the EU for coastal tourism's contribution to GVA and second for employment, underscoring the importance of this sector. The country's extensive coastline and world-famous islands attract millions of tourists annually, making coastal tourism the largest driver of employment and economic activity within the blue economy. The sector is particularly vital in regions like the Aegean and Ionian seas, where tourism supports local businesses, infrastructure, and employment.



In 2021, coastal tourism generated 67% of the total GVA from blue economy activities, a significant rebound from the pandemic's impact in 2020. Despite seasonality challenges, where demand peaks during the summer months, the sector remains central to Greece's tourism and economic strategy. The reliance on high-value tourism—such as luxury cruises, eco-tourism, and nautical sports—helps sustain the industry's profitability, but also places pressure on local environments, calling for sustainable practices to mitigate over-tourism and environmental degradation.

Maritime Transport and Marine Living Resources

Maritime transport remains another critical pillar of Greece's blue economy. The country's ports, including Piraeus—the largest in Greece and the third busiest in the EU—serve as key hubs for both passenger and cargo transport. In 2021, Piraeus handled a significant share of the EU's container traffic, underscoring its importance in international trade. The Port of Thessaloniki and Agioi Theodoroi are also vital contributors, handling large volumes of goods and passengers.

Marine living resources, particularly fisheries, remain an essential sector for Greece. While this sector only employs about 8% of the workforce in the blue economy, it is facing sustainability challenges due to overfishing and unsustainable fishing practices. The Greek government, alongside industry stakeholders, has called for more effective management of fish stocks and better enforcement of fishing regulations to preserve marine biodiversity and ensure the long-term viability of the sector.

Research and Innovation in the Blue Economy

Greece is also a leader in marine research, with institutions like the Hellenic Centre for Marine Research playing a vital role in advancing knowledge in fields such as aquaculture, marine biology, and oceanography. These research initiatives are crucial for supporting innovation and sustainability within the blue economy, particularly as Greece seeks to balance economic growth with environmental protection. Greece's investments in blue biotechnology and renewable ocean energy reflect its commitment to pioneering new solutions for sustainable economic development.

Challenges and Opportunities

Despite its substantial contributions, Greece's blue economy faces a number of challenges:

Environmental Impact: The country's reliance on coastal tourism and maritime transport places significant pressure on its marine and coastal ecosystems. Climate change, pollution, and overfishing threaten the health of Greece's oceans, highlighting the need for more sustainable practices.

Seasonality: Coastal tourism is highly seasonal, leading to economic volatility and strain on local infrastructure during peak months. Diversifying tourism offerings and encouraging year-round travel can help mitigate this issue.

Sustainability in Maritime Transport: With the rise of global shipping, Greece's maritime transport sector must continue to innovate to reduce its carbon footprint and promote sustainable shipping practices. Despite these challenges, Greece's blue economy has significant growth potential, particularly in sustainable tourism, maritime transport, and marine research. The government's focus on reducing the environmental impact of these sectors is critical for ensuring their long-term sustainability. By leveraging innovation and sustainable practices, Greece can capitalize on the growing global demand for eco-friendly tourism and green shipping.

Greece, a maritime nation with over 15,000 kilometers of coastline and more than 3,000 islands, has a deep historical and cultural connection to the Mediterranean Sea and its marine resources. The coastal zone plays a significant role in the country's economy and the livelihoods of its people. Approximately 37.5% of Greece's territory lies within a 10 km coastal zone, where about 80% of the population resides, making coastal regions vital to the country's economy.

The Greek blue economy is diverse, encompassing a wide range of activities including coastal tourism, maritime transport, fisheries, offshore energy, and marine research. Each sector contributes substantially to the country's economic output and employment.

Coastal Tourism: Coastal tourism is the largest component of Greece's blue economy. The country is one of the world's most popular tourist destinations, with millions flocking to its islands and coastal areas each year. The Mediterranean climate, pristine beaches, and cultural heritage sites make Greece a hub for recreational and leisure activities, driving employment and income. The sector is crucial not only to Greece's economy but also to its international trade and relations. In fact, in 2021, coastal tourism was the most significant contributor to Greece's blue economy, accounting for 67% of its Gross Value Added (GVA) and 83% of employment in the sector.

Maritime Transport: The maritime transport sector is another key pillar of the Greek blue economy. Greece is home to one of the largest merchant fleets in the world, which plays a crucial role in global trade. The country's strategic location at the crossroads of Europe, Asia, and Africa ensures that Greece's ports, particularly those in Piraeus, Thessaloniki, and Agioi Theodoroi, are key hubs for shipping and logistics in the Mediterranean. In 2021, Greece ranked sixth in the EU for its contribution to maritime transport employment and GVA. This sector is also integral to the blue economy's resilience, providing economic stability during periods of downturn.

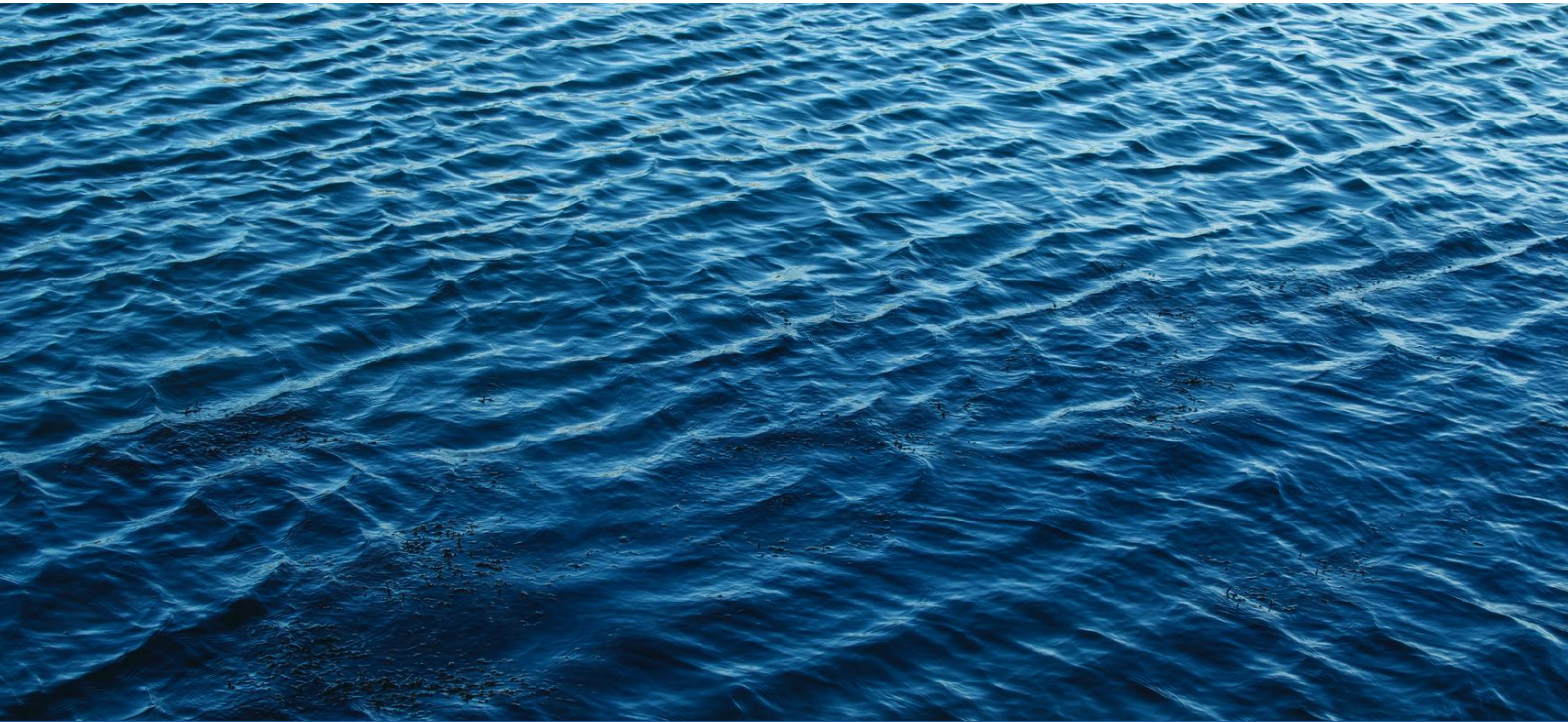
Marine Living Resources: Fishing and aquaculture are also important parts of Greece's blue economy. The country's extensive coastlines and surrounding seas offer rich marine resources. However, the sector faces challenges such as overfishing and unsustainable fishing practices. There are ongoing efforts to address these challenges through better resource management and sustainable practices, ensuring long-term viability. The marine living resources sector contributes about 8% of employment within the blue economy, with fishing being especially important for coastal communities.

Offshore Renewable Energy (ORE): Offshore renewable energy, particularly offshore wind farms, represents an emerging sector with great potential in Greece. The Aegean Sea's high wind potential makes it an ideal location for wind energy development, though challenges remain due to Greece's territorial waters and lack of a fully recognized Exclusive Economic Zone (EEZ). In 2015, Greece introduced a law to facilitate the development of offshore wind farms, aiming to create a favorable environment for investors through spatial planning and strategic zone designation. Despite the potential for growth in this sector, Greece faces hurdles related to spatial planning and stakeholder consultation, which could hinder the development of offshore renewable energy projects.

The country has also taken steps to enhance marine spatial planning (MSP) through initiatives like the ADRIPLAN and Cross-Border Cooperation for Marine Spatial Planning projects. These initiatives aim to gather data and foster collaboration across borders for effective maritime planning, especially for sectors like offshore energy, tourism, and shipping.

Challenges and Opportunities: Greece's geographical features—particularly its mountainous terrain and fragmented archipelago—create complex challenges for spatial planning and marine resource management. The Aegean Sea, in particular, presents conflicts of interest between the various economic activities that rely on its waters. These activities, including aquaculture, fishing, shipping, and tourism, often overlap and require careful management to prevent conflict.

Furthermore, the Aegean's potential for offshore wind energy development is significant, yet the challenges of developing wind farms close to coastal regions, where the most intensive maritime activities occur, must be addressed. The development of innovative floating wind farms could offer solutions, allowing for energy generation in deeper waters that avoid conflicts with other uses.



Conclusion

Greece's blue economy is a dynamic and integral part of its national economy, contributing significantly to employment, income, and international trade. While challenges such as environmental sustainability, spatial planning, and the development of offshore energy infrastructure remain, there is substantial potential for growth, especially in offshore renewable energy. By addressing existing barriers and further developing marine spatial planning frameworks, Greece can harness the full potential of its blue economy, ensuring its long-term sustainability and resilience.

The blue economy in Greece plays an integral role in the country's economy, driving employment, innovation, and international trade. With a strategic focus on coastal tourism, maritime transport, and marine research, Greece stands out as a key player in the EU's blue economy. However, the sector's future growth hinges on addressing environmental concerns, particularly the sustainable management of marine resources. As the country continues to develop its blue economy, it must balance economic opportunities with ecological responsibility to secure a prosperous and sustainable future.

The increasing demand for various sea uses, including offshore wind energy, has made marine spatial planning (MSP) a crucial tool for managing these growing and often competing activities. MSP serves to bring together stakeholders from multiple sectors—such as energy, industry, government, fisheries, conservation, and recreation—ensuring that marine resources are used effectively and sustainably. By clarifying where activities like offshore wind farms can or cannot be developed, MSP helps to reduce conflicts, promote cross-border cooperation, and ensure the environmental protection of marine ecosystems.

In the Mediterranean region, the lack of a defined Exclusive Economic Zone (EEZ) for most EU Member States severely limits the scope for MSP beyond the territorial waters of 12 nautical miles. Cyprus is the exception, with a recognized EEZ, but for most Mediterranean countries, this absence of a clear marine boundary hinders the implementation of comprehensive MSP. In Greece, despite its rich maritime heritage and strategic location, a formal coastal policy is still lacking, and the full implementation of MSP is yet to be realized. Instead, the country continues to rely on sectoral approaches to manage its maritime activities, which often result in fragmented decision-making.

Greece has made strides toward improving spatial planning for offshore renewable energy (ORE), particularly in the context of offshore wind farms. Initiatives have been launched to collect data and assess current human activities and environmental conditions at sea, forming the basis for more informed decision-making. However, it is premature to assert that these sectoral practices have resolved the challenges of identifying optimal locations for offshore wind development. The current approach falls short of fully implementing MSP, which would provide a framework for coordinating wind energy development with other maritime uses.

The implementation of MSP in Greece could significantly benefit the offshore wind industry by ensuring that wind energy is considered alongside other marine activities, rather than in isolation.

A comprehensive MSP approach would allow for more flexible management of marine space, where established activities could be renegotiated to accommodate new developments like wind farms. This would ensure that offshore wind energy has dedicated space within Greece's crowded maritime landscape. Furthermore, MSP could prioritize wind energy, enabling this emerging industry to secure a foothold in areas where it may compete with traditional sectors.

In conclusion, while Greece has made progress in developing offshore wind energy, a formal, comprehensive MSP framework is needed to fully unlock the potential of the blue economy. Through MSP, Greece can more effectively balance offshore wind energy with other maritime uses and environmental goals, ensuring sustainable development of its marine resources. The integration of wind farms into the broader marine spatial planning process would not only benefit the wind energy sector but also contribute to the broader goal of sustainable and coordinated marine resource management in Greece. Early impact assessments and careful planning will be key to ensuring the successful integration of wind farms into Greece's marine environment.

4.1.2 Key Stakeholders in Greece

The development of Greece's blue economy involves a diverse set of stakeholders, each playing a crucial role in shaping policies, fostering innovation, and ensuring the sustainable use of the country's vast maritime resources.



These stakeholders span government authorities, maritime industries, environmental organizations, academia, the private sector, local communities, and international institutions. Together, they contribute to advancing the country's maritime sector and facilitating the implementation of Marine Spatial Planning (MSP).

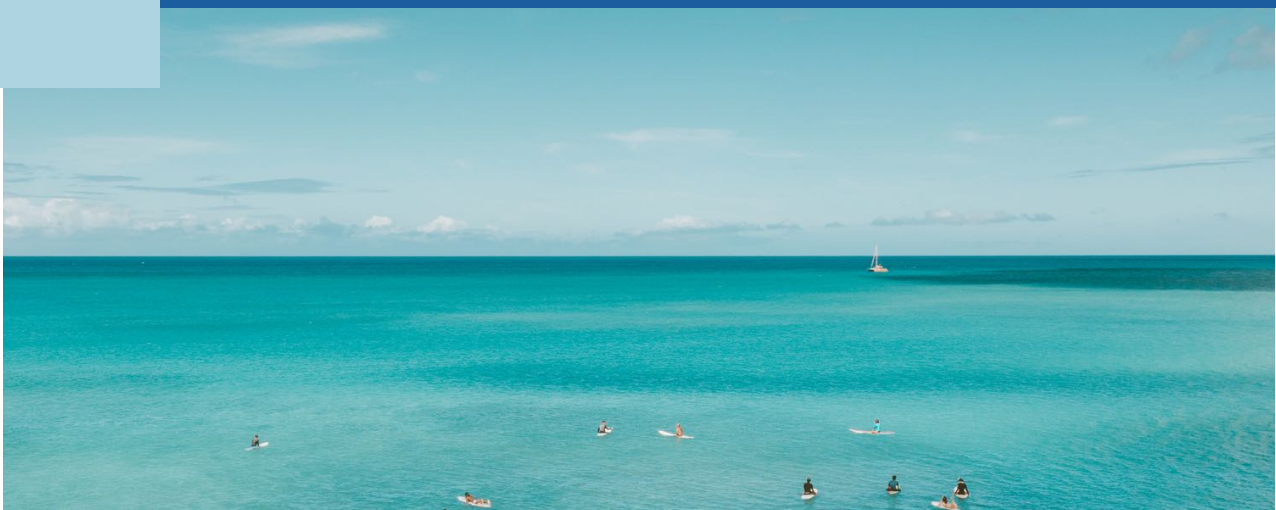
Government Authorities are central to the regulatory framework that governs Greece's blue economy. The Ministry of Environment and Energy (YPEN) is responsible for national policies related to the environment, energy, and maritime affairs, playing a pivotal role in the development of MSP and broader blue economy strategies. The Ministry of Maritime Affairs and Insular Policy oversees shipping, port management, and island issues, while the Ministry of Rural Development and Food focuses on the sustainable management of maritime resources like fisheries and aquaculture. Additionally, the Hellenic Coast Guard ensures maritime safety and enforces laws, protecting Greece's territorial waters, while local government authorities implement blue economy strategies at the regional and municipal levels, especially concerning coastal zone management and maritime infrastructure.

Maritime Industry and Enterprises are critical stakeholders in the blue economy. Greece's shipping companies, a key component of the country's longstanding maritime tradition, play a leading role globally, contributing significantly to the economic landscape. Port authorities and operators, such as those managing the ports of Piraeus and Thessaloniki, are integral to the logistics, shipping, and tourism sectors. The aquaculture and fisheries industries also play a key role, providing essential seafood products while relying on sustainable practices to ensure their long-term viability. In the renewable energy sector, offshore wind energy developers are becoming increasingly important as Greece focuses on harnessing its renewable resources to contribute to the blue economy.

Environmental organizations also have a significant role in advocating for sustainable practices. Groups like Greenpeace Greece and WWF Greece work to protect marine biodiversity and promote sustainable use of marine resources. Scientific research institutions such as the Hellenic Centre for Marine Research (HCMR) provide crucial data on marine ecosystems, supporting policy decisions related to environmental conservation and sustainable maritime development.

Academia and Research Institutions in Greece are at the forefront of advancing scientific knowledge in marine science, policy, and technology. Universities like the University of Athens and the University of Crete, as well as research centers, contribute valuable expertise in areas such as marine engineering, environmental law, and marine biotechnology. These institutions also collaborate with the private sector, driving innovation in emerging fields within the blue economy.

The private sector and entrepreneurs are also vital to Greece's blue economy. Blue economy startups focusing on marine biotechnology, aquaculture, and renewable energy bring innovative solutions to market.



Maritime tourism operators, including those in coastal and marine tourism such as cruise lines, diving schools, and yacht charters, are essential to the sector's growth. Additionally, fishing and seafood processing companies are integral to the supply chain, providing a significant portion of the country's seafood exports while ensuring sustainable fishing practices.

International and EU institutions play a significant role in shaping Greece's blue economy through funding and policy guidance. The European Union is a key partner, providing resources through initiatives like the EU's Integrated Maritime Policy and the European Maritime and Fisheries Fund (EMFF). International Maritime Organizations (IMO) help set global standards for shipping and environmental protection. Furthermore, Greece is actively involved in global maritime agreements and regional cooperation efforts to safeguard marine resources.

Coastal Communities and Local Stakeholders are directly affected by policies regarding coastal development, maritime industries, and the preservation of the marine environment. Fishing communities, whose livelihoods depend on the sustainable management of marine resources, have a strong interest in preserving fish stocks and ensuring fair practices. The significance of tourism stakeholders cannot be understated, as the Greek islands are some of the most popular tourist destinations in the Mediterranean. Local residents in coastal areas are also affected by decisions related to maritime activities and coastal zone management, making their input vital to the success of blue economy initiatives.

Financial institutions and investors are also key players, providing the capital necessary to finance blue economy projects. Banks, venture capital firms, and private equity funds support businesses involved in emerging sectors like offshore wind energy, aquaculture, and marine biotechnology, helping to translate innovative ideas into viable, marketable projects.

Trade Associations and Professional Bodies, such as the Greek Shipping Cooperation Committee (GSCC), represent the interests of the shipping industry, advocating for policies that support this sector. Similarly, organizations like the Greek Fisheries and Aquaculture Federation (GFAF) and the Association of Renewable Energy Producers ensure that the interests of specific industries are addressed within the broader policy context.

Lastly, civil society and public advocacy groups, including local environmental advocates and public engagement platforms, play a significant role in raising awareness about the importance of marine environmental protection and advocating for sustainable use of resources. These groups also work to ensure that the public's concerns are incorporated into decision-making processes, which is particularly important in the context of large-scale projects like offshore wind farms.

In conclusion, the development of Greece's blue economy is shaped by a broad spectrum of stakeholders, each contributing in different ways to the growth of maritime industries while ensuring the protection and sustainable use of marine resources. Effective collaboration between these diverse groups is crucial for advancing policies, fostering innovation, and achieving a sustainable and prosperous blue economy for Greece.

4.1.3. Questionnaire (Greece)

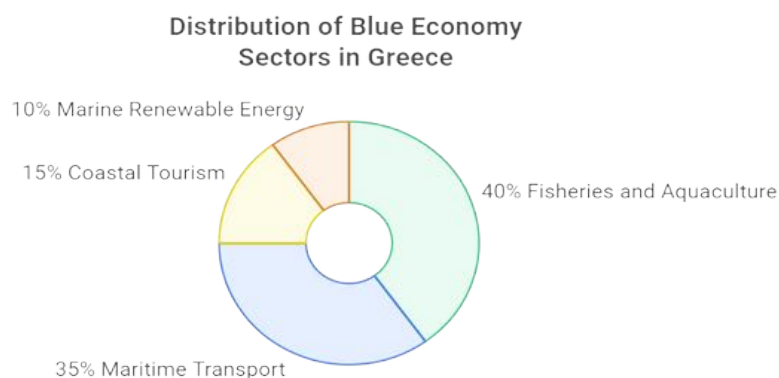
This report presents the interpretation of the questionnaire results collected from 43 stakeholders involved in Greece's blue economy. The questionnaire was distributed online to various stakeholders, including government representatives, industry professionals, researchers, and community organizations, with the aim of assessing the current status, challenges, and potential for growth within Greece's maritime sectors.

The survey focused on several key areas: the development and sustainability of blue economy sectors, the integration of innovative technologies, the role of stakeholders in shaping policies, and the future opportunities for growth and collaboration. The findings from the questionnaire provide insights into the strengths and weaknesses within the blue economy, highlight the barriers to progress, and identify the areas where Greece can enhance its blue economy practices through innovation, policy alignment, and improved stakeholder engagement.

The analysis of the responses will be presented below, with each section reflecting the key themes and trends identified in the questionnaire. The interpretation aims to provide a comprehensive understanding of the perspectives of various stakeholders, identify areas for improvement, and offer strategic recommendations for advancing Greece's blue economy, fostering sustainability, and ensuring the effective integration of new technologies. The findings will serve as a foundation for policy discussions and help inform future initiatives designed to unlock the potential of Greece's maritime sectors.

1. ****Which sector of the blue economy is most developed in Greece's maritime regions?***

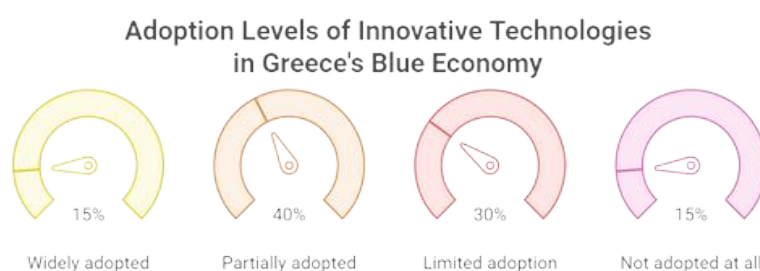
- A) Fisheries and Aquaculture (40%)
- B) Maritime Transport (35%)
- C) Coastal Tourism (15%)
- D) Marine Renewable Energy (10%)



The most developed sectors in Greece's blue economy are Fisheries and Aquaculture (40%) and Maritime Transport (35%), indicating that these traditional industries remain central to the country's maritime activities. However, Marine Renewable Energy (10%) and Coastal Tourism (15%) show lower development levels, suggesting room for future growth in these areas, particularly in renewable energy, which holds potential for diversification.

2. ****What is the current level of adoption of innovative technologies in Greece's blue economy?***

- A) Widely adopted across most sectors (15%)
- B) Partially adopted, with significant gaps (40%)
- C) Limited adoption in specific sectors (30%)
- D) Not adopted at all (15%)



The majority of stakeholders (40%) indicated that innovative technologies are partially adopted, with significant gaps. This highlights a need for greater investment in innovation across the blue economy, as only 15% of respondents believe that new technologies are widely adopted.

3. ****What are the key barriers to sustainability for blue economy enterprises in Greece?***

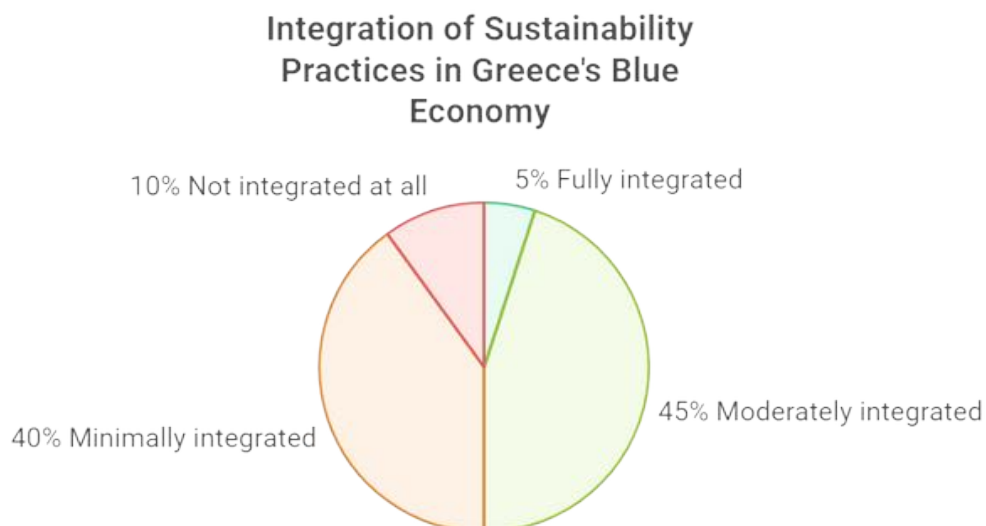
- A) Financial constraints (35%)
- B) Lack of technological innovation (25%)
- C) Regulatory challenges (25%)
- D) Low stakeholder collaboration (15%)



Financial constraints (35%) and lack of technological innovation (25%) were identified as the primary barriers to sustainability, underlining the challenge of financing green transitions and technological advancements. Regulatory challenges and low stakeholder collaboration were also cited, indicating the importance of improving governance and cooperation in the sector.

4. ****How integrated are sustainability practices within Greece's blue economy enterprises?***

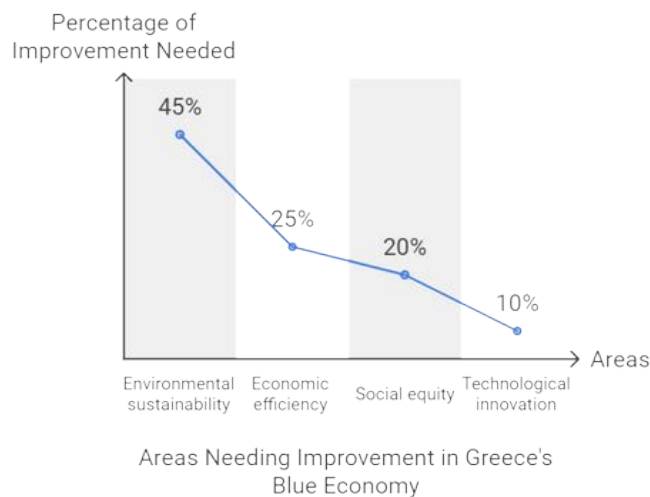
- A) Fully integrated (5%)
- B) Moderately integrated, with room for growth (45%)
- C) Minimally integrated (40%)
- D) Not integrated at all (10%)



The responses show that sustainability practices are moderately integrated (45%) in Greece's blue economy, with 40% of stakeholders noting that sustainability practices are minimally integrated. This suggests that there is considerable room for further integration of sustainable practices within industries such as fisheries, aquaculture, and maritime transport.

5. ****Which area requires the most improvement in Greece's blue economy practices?***

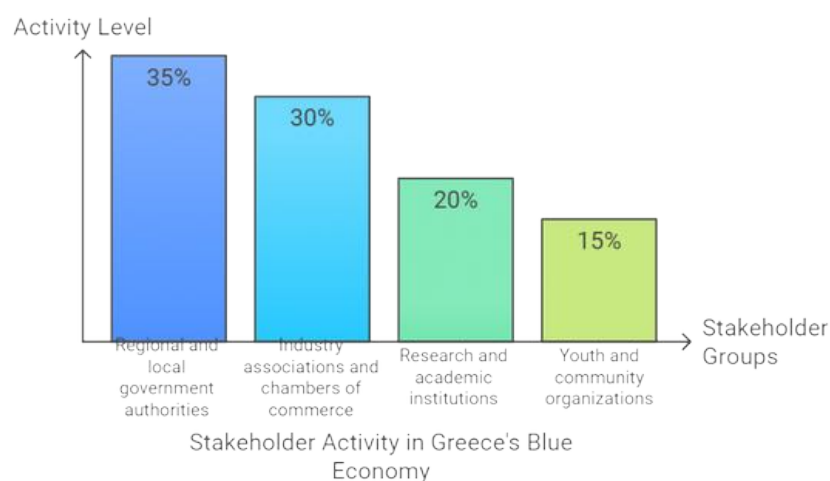
- A) Environmental sustainability (45%)
- B) Economic efficiency (25%)
- C) Social equity (20%)
- D) Technological innovation (10%)



The greatest need for improvement is in environmental sustainability (45%), reflecting the ongoing challenge of balancing economic growth with environmental protection. Economic efficiency (25%) and technological innovation (10%) were also highlighted as important, but sustainability remains the top priority.

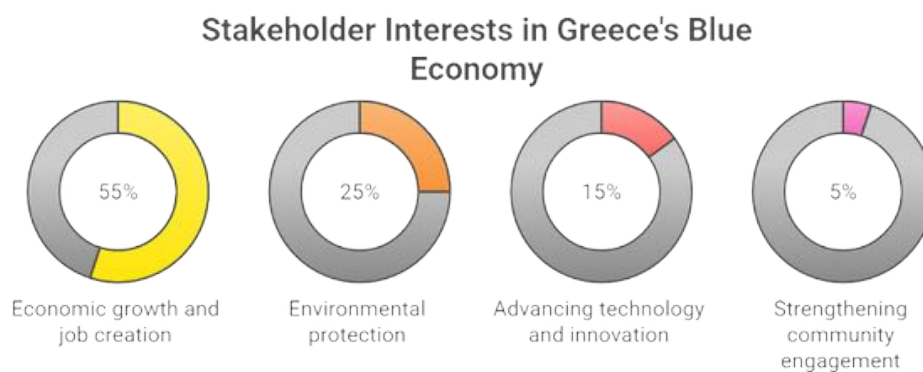
6. ****Who are the most active stakeholders in Greece's blue economy?***

- A) Regional and local government authorities (35%)
- B) Industry associations and chambers of commerce (30%)
- C) Research and academic institutions (20%)
- D) Youth and community organizations (15%)



Local and regional government authorities (35%) are identified as the most active stakeholders, followed by industry associations and chambers of commerce (30%). This shows that public sector engagement is strong, but there is a clear role for private sector actors in driving the blue economy forward.

7. ****What is the primary interest of stakeholders in Greece's blue economy?***
- A) Economic growth and job creation (55%)
 - B) Environmental protection (25%)
 - C) Advancing technology and innovation (15%)
 - D) Strengthening community engagement (5%)



Stakeholders in Greece's blue economy are most focused on economic growth and job creation (55%), indicating that the economic potential of the blue economy is a central concern. Environmental protection (25%) and advancing technology and innovation (15%) are also priorities, but economic development remains the driving force.

8. ****How would you assess the level of collaboration among stakeholders in Greece?***
- A) Highly collaborative (20%)
 - B) Moderately collaborative (40%)
 - C) Limited collaboration (30%)
 - D) No collaboration at all (10%)



The responses suggest a moderate level of collaboration (40%) among stakeholders, with 20% reporting highly collaborative environments. While this indicates positive engagement, it also shows that there is substantial room for improvement in fostering stronger cooperation across sectors.

9. ****What are the expectations of stakeholders from Greece's engagement in the sustainable transnational network?***

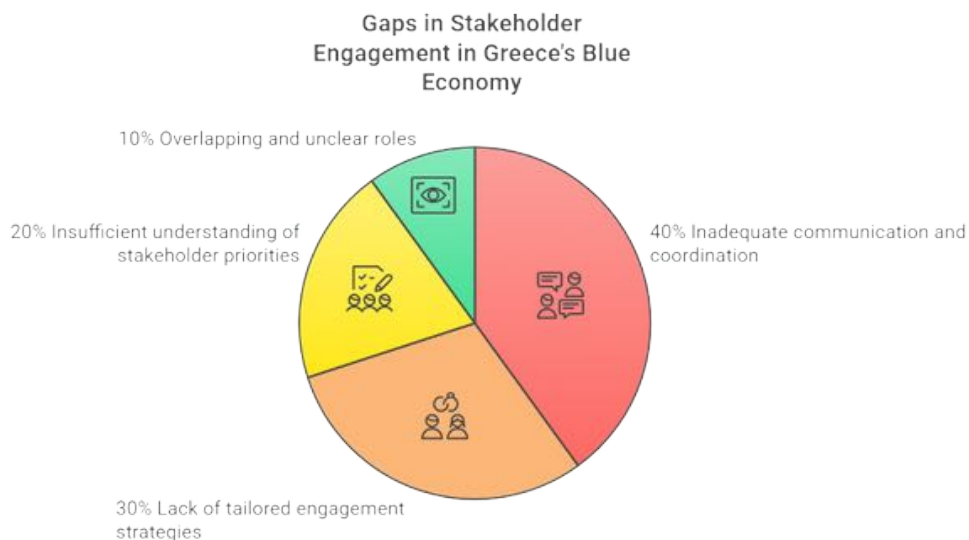
- A) Greater access to international funding (35%)
- B) Capacity-building and knowledge exchange (30%)
- C) Improved policy alignment with the EU (25%)
- D) Enhanced opportunities for youth participation (10%)



The greatest expectations are for greater access to international funding (35%) and capacity-building and knowledge exchange (30%). This reflects a desire for Greece to integrate more fully into international initiatives, gaining access to resources and expertise to support its blue economy development.

10. ****What is the biggest gap in stakeholder engagement in Greece's blue economy?***

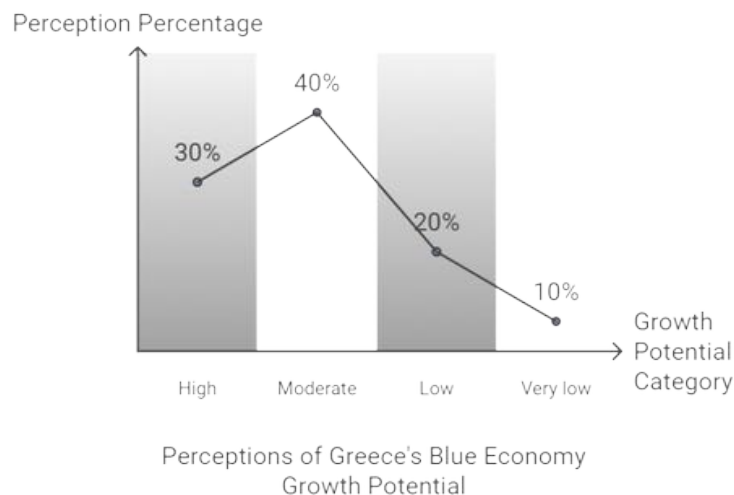
- A) Inadequate communication and coordination (40%)
- B) Lack of tailored engagement strategies (30%)
- C) Insufficient understanding of stakeholder priorities (20%)
- D) Overlapping and unclear roles (10%)



The most significant gap identified is inadequate communication and coordination (40%), followed by lack of tailored engagement strategies (30%). This points to a need for clearer and more effective stakeholder management to ensure that the various sectors work together towards shared goals.

11. ****How would you describe the potential for growth in Greece's blue economy?***

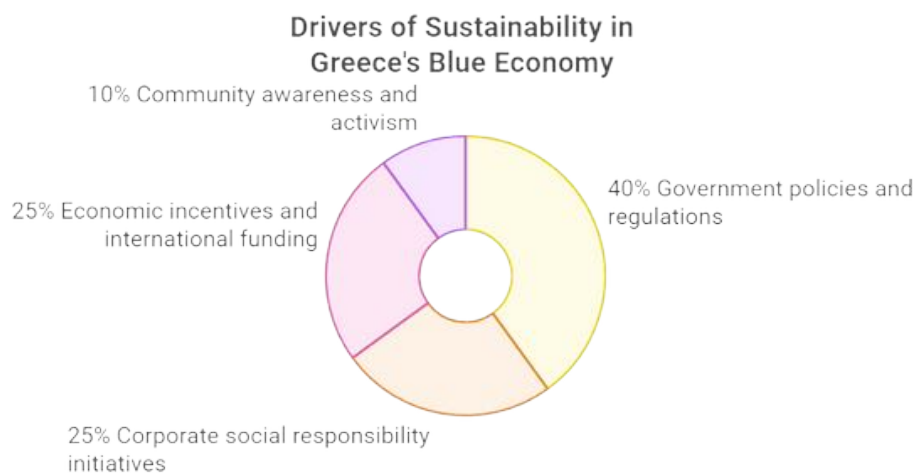
- A) High, with untapped resources and opportunities (30%)
- B) Moderate, with some limitations (40%)
- C) Low, due to significant barriers (20%)
- D) Very low, with minimal growth expected (10%)



The majority of respondents believe that the growth potential of Greece's blue economy is moderate, with some limitations (40%). While there is optimism, respondents also acknowledge challenges such as regulatory barriers and sustainability concerns.

12. ****What drives sustainability efforts in Greece's blue economy?***

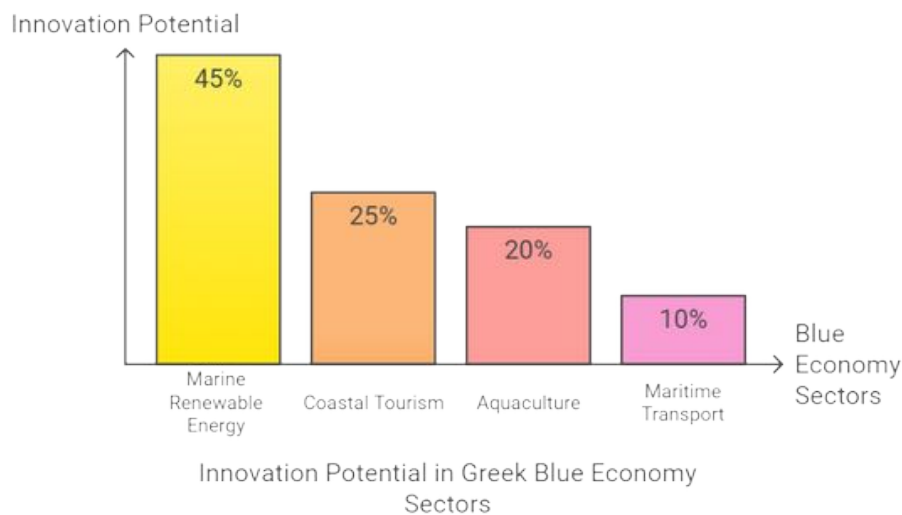
- A) Government policies and regulations (40%)
- B) Corporate social responsibility initiatives (25%)
- C) Economic incentives and international funding (25%)
- D) Community awareness and activism (10%)



40%) are seen as the key drivers of sustainability efforts in Greece's blue economy, with corporate social responsibility and economic incentives both contributing to sustainable practices.

13. ****Which blue economy sector in Greece has the greatest potential for innovation?***

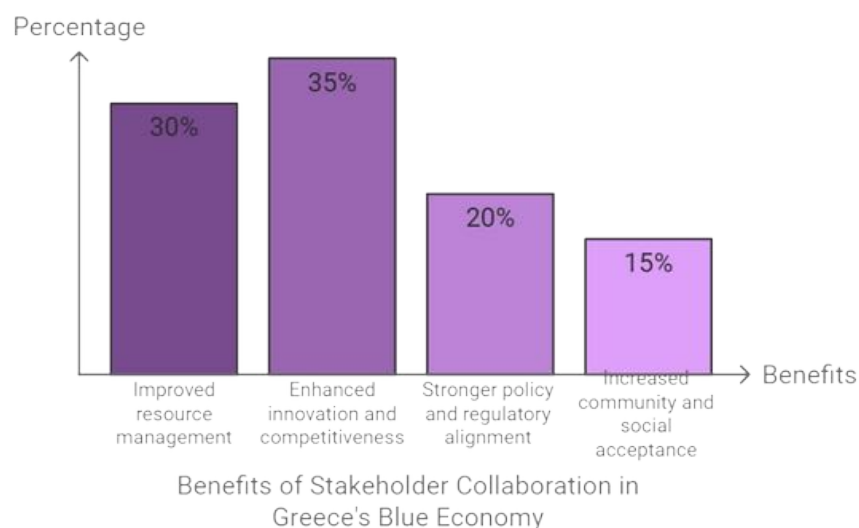
- A) Marine Renewable Energy (45%)
- B) Coastal Tourism (25%)
- C) Aquaculture (20%)
- D) Maritime Transport (10%)



(45%) is identified as the sector with the greatest potential for innovation, suggesting strong interest in expanding this sector in Greece. Coastal tourism (25%) and aquaculture (20%) are also seen as important, but renewable energy stands out as the most promising area for technological advancements.

14. ****What is the most significant benefit of stakeholder collaboration in Greece's blue economy?***

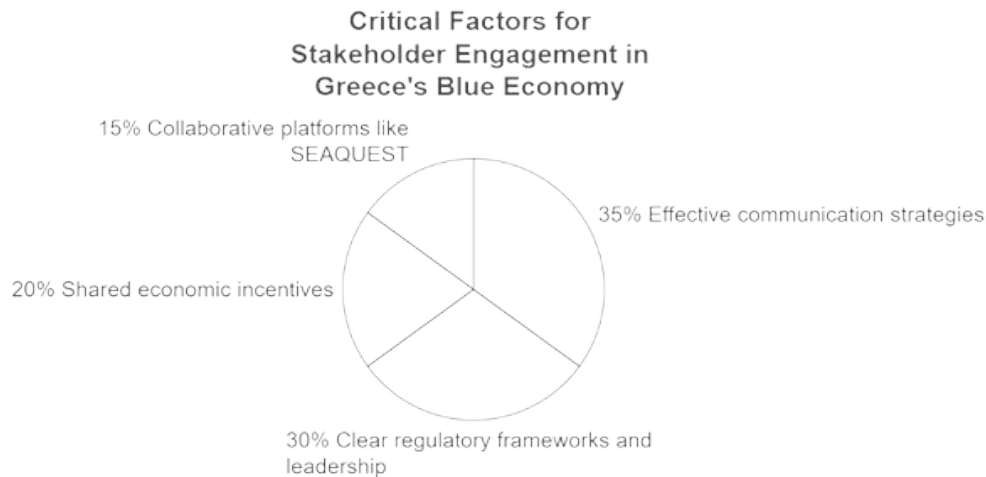
- A) Improved resource management (30%)
- B) Enhanced innovation and competitiveness (35%)
- C) Stronger policy and regulatory alignment (20%)
- D) Increased community and social acceptance (15%)



The main benefits of stakeholder collaboration are seen in improved resource management (30%) and enhanced innovation and competitiveness (35%). Collaboration is recognized as key to creating a more integrated and efficient blue economy.

15. **What factor is most critical for successful stakeholder engagement in Greece's blue economy?*

- A) Effective communication strategies (35%)
- B) Clear regulatory frameworks and leadership (30%)
- C) Shared economic incentives (20%)
- D) Collaborative platforms like SEAQUEST (15%)



Effective communication strategies (35%) are considered the most critical for successful stakeholder engagement, emphasizing the need for clear, transparent dialogue. Regulatory frameworks and shared economic incentives are also vital for fostering deeper cooperation.

In summary, the questionnaire reveals a blue economy in Greece with significant growth potential, especially in marine renewable energy, but also faces challenges related to sustainability, innovation, and stakeholder collaboration. Key areas for future development include improving communication and coordination among stakeholders, increasing the adoption of new technologies, and addressing barriers to sustainability through both policy and financial support.

4.2. Türkiye

Detailed Review of the Black Sea Region Blue Economy Sectors

The Black Sea is a sea located in the north of Turkey and stands out with its rich biodiversity. This sea provides an important resource for many sectors such as fisheries, aquaculture, marine energy, maritime transportation and coastal tourism. However, the sustainability of these sectors faces various challenges.

Fisheries and Aquaculture

Today, especially in developed countries, people pay great attention to their nutrition and are careful to choose healthy foods in their eating habits. Among these foods, fish meets the body's basic nutrient needs with its rich protein content and polyunsaturated fatty acids in its structure, and is among the most important nutrients in maintaining a healthy life due to its positive effects on human physiology and metabolic functions (Kaya et al. 2004). Aquaculture, one of the world's largest sources of animal protein, is one of the important sectors that continuously provides input to the economies of all countries today. In the report published by the Organization for Economic Co-operation and Development (OECD) in 2016, it was noted that aquaculture production showed the fastest growth among agricultural products.

Similarly, in its 2022 report, the Food and Agriculture Organization of the United Nations (FAO) announced that the aquaculture sector is the sector that has developed the most in the agricultural sector in recent years.

The Black Sea has been the center of fishing for many years. Famous for fish species such as anchovy, bonito and horse mackerel, this sea once offered abundant catches. However, factors such as overfishing, marine pollution and climate change have caused serious declines in fish stocks. This situation negatively affects both the livelihoods of fishermen and the economy of the region.

In recent years, the aquaculture sector has shown significant development, especially in salmon and trout farming. Closed-circuit systems and cage farming activities play an important role in meeting the demand for fish. However, this sector also struggles with diseases, poaching and environmental problems.

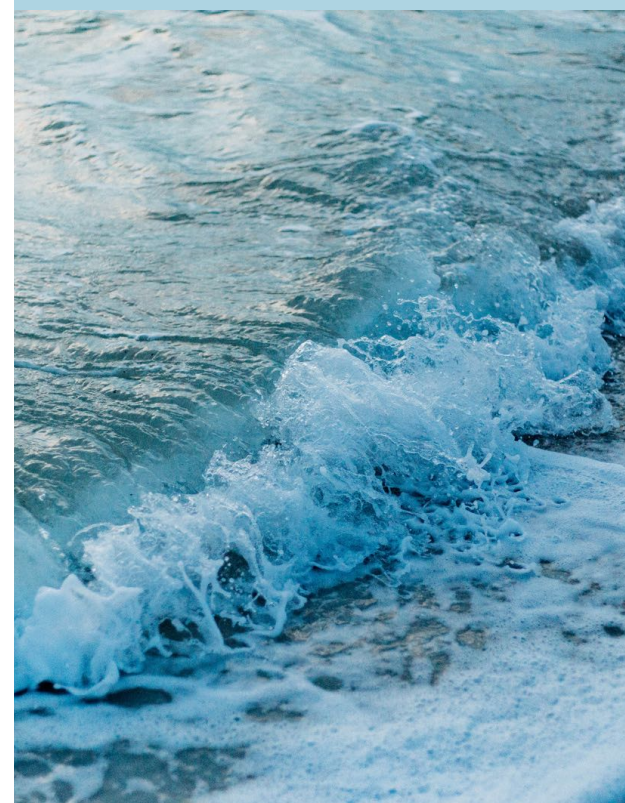
Definition of the Industry

Food products are essential nutrients that people need to continue their lives. Humanity has developed some measures to market these food products without spoiling or rotting during the period until they are consumed. High temperature application, drying, preservation in brine and cooling methods are some of these measures. The cooling method is applied in cold storages at a certain temperature and humidity in order to preserve the fresh appearance of food products and their smell, flavor and vitamin values at a level closest to nature. Cold rooms are defined as spaces that are cooled under appropriate conditions and whose humidity is controlled, and insulated against heat and moisture gain from the external atmosphere so that food products can be stored for longer than their normal storage periods. (Hürkuş, 2021)

Products such as seafood, animal products, fresh fruits and vegetables are perishable and must be stored under appropriate conditions from production to consumption. In this context, the subject of the study is the establishment of a facility for the preservation of seafood in the Kilimli port of Zonguldak province. The NACE code of the investment planned to be made within the scope of the report is 52.10.02, defined as "refrigerated storage and warehousing activities (storage for frozen or chilled goods, including perishable food products)".

Supports Provided to the Sector

When the status of the investment subject to feasibility is examined in terms of benefiting from supports; it is seen that the investment is within the scope of the incentive system and regional incentive support elements can be used.



In addition, it is possible to benefit from the low-interest loans provided to investors through the Ziraat Bank and Agricultural Credit Cooperatives with the Communiqué on Supporting Rural Development Investments of the Ministry of Agriculture and Forestry.

Investment Incentive System

The Investment Incentive System is a nationwide support scheme implemented by the Ministry of Industry and Technology. It entered into force with the Decree of the Council of Ministers dated 15.06.2012 and numbered 2012/3305 (Decree on State Aids in Investments). Incentives and support elements for investments are implemented within the scope of the communiqué legislation on the implementation of this decision. The investment incentive system consists of four main incentive items. These are General Incentives, Regional Incentives, Incentives for Priority Investments and Incentives for Large Scale Investments.

Regional incentive support elements are listed below:

Customs Duty Exemption: It is applied in the form of non-payment of customs duty for investment machinery and equipment to be procured from abroad within the scope of the incentive certificate. As of 29.06.2021, for the machinery and equipment to be imported within the scope of the investment incentive certificates issued based on the applications made as of 29.06.2021, customs duty exemption is not applied for the machinery and equipment specified in Annex-8 of the Decree No. 3305. The said machinery and equipment cannot be provided as used or reconditioned within the scope of the incentive certificate

Value Added Tax Exemption: It is applied in the form of non-payment of value added tax for investment goods machinery and equipment to be procured domestically and from abroad within the scope of the incentive certificate and for software and intangible rights sales and leases within the scope of the certificate.

Tax Reduction: It is the discounted application of income or corporate tax until the contribution amount foreseen for the investment is reached.

Insurance Premium Employer Share Support: The Ministry covers the portion of the employer's share of the insurance premium corresponding to the minimum wage to be paid for the additional employment provided by the investment covered by the incentive certificate.

Income Tax Withholding Support: Cancellation of the income tax withholding for the additional employment provided by the investment within the scope of the incentive certificate. It is foreseen only in incentive certificates issued for investments to be realized in the 6th region and strategic investments supported under the Technology-Oriented Industrial Move Program.

Insurance Premium (Worker's Share) Support: The Ministry covers the portion corresponding to the minimum wage of the insurance premium workers' share that must be paid for the additional employment provided by the investment covered by the incentive certificate. It is foreseen only in incentive certificates issued for regional and strategic investments to be realized in the 6th region and strategic investments supported within the scope of the Technology-Oriented Industrial Move Program.

Interest or Dividend Support: It is a financing support provided for investment loans with a maturity of at least one year used within the scope of the incentive certificate, and a certain portion of the interest or profit share to be paid for the loan used up to 70% of the fixed investment amount registered in the incentive certificate is covered by the Ministry.

Investment Location Allocation: Allocation of investment space for investments for which an incentive certificate has been issued within the framework of the procedures and principles determined by the Ministry of Treasury and Finance.

Value Added Tax Refund: Refund of VAT collected for building-construction expenditures realized within the scope of Strategic Investments with a fixed investment amount above 500 million Turkish Liras. Under the investment incentive system, Turkey is divided into six incentive regions. Investments can receive incentives according to the support elements of the incentive region to which the provinces in which they are realized belong. Until 2021, the province-based regional incentive system was applied, while the district-based incentive system entered into force with the Presidential decision dated 20.08.2020 and started to be applied as of 01.01.2021. Zonguldak province is located in the 3rd region in the investment incentive system. With the district-based incentive system; Kilimli and Gökçeşey districts are in the 4th region, while Zonguldak Center, Alaplı, Kdz. Ereğli, Kozlu, Devrek and Çaycuma districts remained in the 3rd region. In addition, investments to be made in organized industrial zones and industrial zones can benefit from sub-regional supports

Table-1: Aquaculture production by country

<u>China</u>	<u>62.242.310</u>
<u>Indonesia</u>	<u>13.455.205</u>
<u>India</u>	<u>13.253.701</u>
<u>Vietnam</u>	<u>7.871.286</u>
<u>USA</u>	<u>5.290.541</u>
<u>Russia</u>	<u>5.211.894</u>
<u>Peru</u>	<u>4.968.902</u>
<u>Bangladesh</u>	<u>4.384.219</u>
<u>Norway</u>	<u>3.762.245</u>
<u>Japan</u>	<u>3.762.008</u>
<u>Thailand</u>	<u>2.506.731</u>
<u>Turkey</u>	<u>834.662</u>
<u>Other</u>	<u>50.313.341</u>

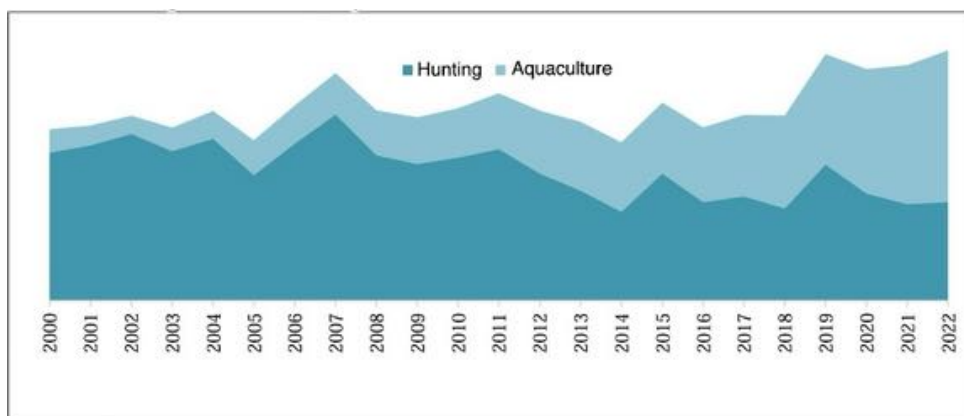
While the majority of the seafood produced worldwide is used directly for food supply, some of it is also used in the production of non-food products, especially fish meal and fish oil. As with other food products, in order to ensure high product quality in seafood, which is the subject of this report, the product must be kept under appropriate conditions from production to consumption. Turkey's Aquaculture Production Although our aquaculture production has been of fishing nature in the past, the share of aquaculture in production has increased over the years. There have been significant developments in aquaculture systems in Turkey in recent years, and the transfer of fish farms in the seas to open and deep waters has necessitated the use of new techniques suitable for the conditions here, and accordingly, cage sizes and structures, net systems, feeding systems have been improved by applying technology above world standards (Bilgüven and Can, 2018).

Table-2: Türkiye aquaculture production amount (tons)

Years	Hunting	Aquaculture	Toplam
2012	432.442	212.410	644.852
2013	374.121	233.394	607.515
2014	302.212	235.133	537.345
2015	431.907	240.334	672.241
2016	335.320	253.395	588.715
2017	354.318	276.502	630.820
2018	314.094	314.537	628.631
2019	463.168	373.356	836.524
2020	364.400	421.411	785.811
2021	328.165	471.686	799.851
2022	335.003	514.805	849.808

Source: TÜİK, 2023

Aquaculture production in Turkey increased by 6% in 2022 compared to the previous year and reached 849 thousand 808 tons. Production from hunting increased by 2% in 2022 compared to the previous year, and aquaculture production increased by 9% compared to the previous year. The fact that the amount of product obtained from hunting in aquaculture production is decreasing and the amount of product obtained from aquaculture is increasing is an indication that global production is in the right direction (Table 2).



Source: TÜİK, 2023

Figure-1: Türkiye hunting and aquaculture quantities

In Turkey, 60.5% of aquaculture production is made up of aquaculture production. 72% of aquaculture production was in the seas and 28% in inland waters. The most important fish species cultivated were trout with 145,649 tons in inland waters, sea bass with 156,602 tons in the seas, and sea bream with 152,469 tons.

Table-3: Türkiye aquaculture production amount (tons)

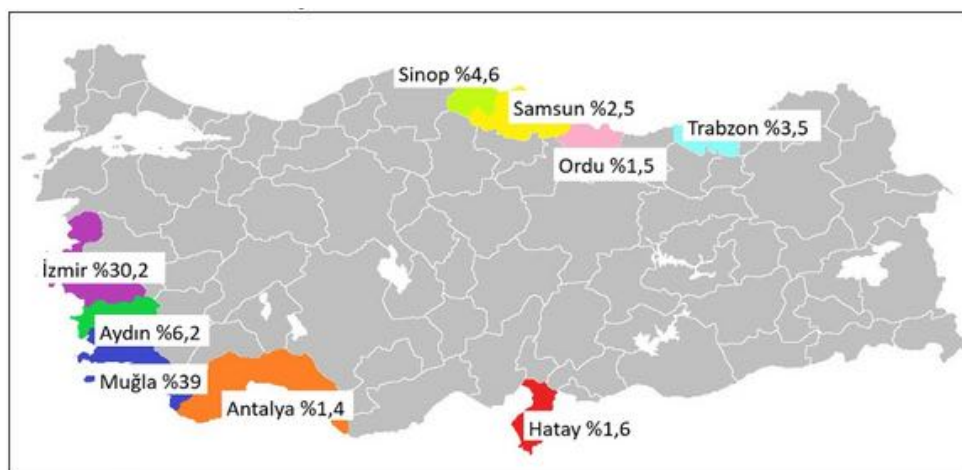
Years	Marine Aquaculture	Inland Water Aquaculture	Toplam
2012	100.853	111.557	212.410
2013	110.375	123.019	233.394
2014	126.894	108.239	235.133
2015	138.879	101.455	240.334
2016	151.794	101.601	253.395
2017	172.492	104.010	276.502
2018	209.370	105.167	314.537
2019	256.930	116.426	373.356
2020	293.175	128.236	421.411
2021	335.644	136.042	471.686
2022	368.742	146.063	514.805

Source: TÜİK, 2023

Aquaculture is carried out in inland waters such as dam lakes, natural lakes, rivers and other water sources, and in the seas. Although the amount of aquaculture production in inland waters was higher

than that in the seas in previous periods, the amount of production in the seas has been higher than that in inland waters for the last 10 years.

Of the fish produced through aquaculture in the seas, 30% are sea bass, 30% are sea bream, and 37% are trout. Of the fish produced through aquaculture in inland waters, 76% is trout production.



Source : TÜİK, 2023

Figure -2: Important provinces where marine aquaculture is carried out (2023)

In Turkey's fishing production, marine fish catching, especially sea fish, has an important place. In 2022, 90% of the total fishing production was provided by the seas. While 71% of the total fishing was made up of marine fish catching, 29% was made up of other marine fish catching.

Table-4: Fisheries catch amount (tons)

Years	Sea	Inland Water	Total
2013	339.047	35.074	374.121
2014	266.078	36.134	302.212
2015	397.731	34.176	431.907
2016	301.464	33.856	335.320
2017	322.173	32.145	354.318
2018	283.955	30.139	314.094
2019	431.572	31.596	463.168
2020	331.281	33.119	364.400
2021	295.025	33.140	328.165
2022	301.747	33.256	335.003

Source: TÜİK, 2023

In 2022, fisheries catch increased by 2% compared to the previous year, reaching 335 thousand 3 tons. Seafood catch increased by 2% compared to the previous year, while there was almost no change in inland fisheries catch. The most important species caught in inland waters is the pearl mullet with a 30% share.

Table-5: Catch amount by sea (tons)

Years	Mediterranean	West Black Sea	East Black Sea	Aegean	Marmara	Total
2017	13.811	77.900	157.952	47.676	24.832	322.172
2018	12.726	86.922	89.355	42.612	52.338	283.954
2019	13.802	76.557	270.197	41.216	29.797	431.572
2020	15.336	113.425	136.268	42.106	24.146	331.281
2021	14.922	79.523	149.103	37.076	14.400	295.025
2022	13.086	118.168	103.339	42.939	24.216	301.747

Source TÜİK, 2023

The Black Sea Region has the most important share in sea fishing with 73%. Although there are no major changes in the amount of products obtained from fishing over the years, there are major differences in the amount of species caught. The most important species caught from the seas in Turkey is anchovy. Anchovy catches have changed significantly over the years. The fish species with the highest increase in catches in 2022 compared to the previous year is bonito, although the catch varies depending on environmental factors and the biology of the bonito species.

Fresh fish should be consumed within 1-2 days when stored in refrigerator conditions. In order to extend this period commercially and maintain quality for a certain period, appropriate processing technologies and appropriate packaging methods should be used together. Freezing and frozen preservation are widely used methods to preserve the sensory and nutritional properties of aquatic products. (Balçık Mısır, 2019) According to FAO data, live, fresh or chilled products are generally the most preferred and highest priced products. 45% of these products are used directly for human consumption. The remaining 31% is frozen, 12% is canned and 12% is cured (dried, salted, pickled, fermented and smoked) products. Preservation in ice is the main processing method of aquatic products intended for human consumption. Approximately 56% of the products processed for human consumption and 27% of the total aquatic product production are products preserved in ice.

Production, Capacity and Demand Forecast

The “blue growth strategy”, which includes the smart, sustainable and inclusive growth of all sectors related to the sea, from tourism to transportation, from underground resources to fishing, and aims to provide maximum benefit from these sectors, has become one of the focal points in the development initiatives of countries in recent years. Important plans and programs are being made within the framework of these strategies in our country. The fishing and farming sector and the targets set in this sector are also an important part of these plans and programs. The 2023 targets for aquaculture have been determined as 600,000 tons by the Ministry of Agriculture and Forestry. The production potential made by the hunting method continues to increase.

In this direction, the need for investments such as aquaculture storage facilities, icehouses, auction areas, processing and packaging facilities, etc. will continue to increase.



In the province of Zonguldak, which has an 80 km long coast, it is envisaged to open production areas and carry out aquaculture with an annual capacity of at least 10,000 tons within the next 5 years with the aquaculture project initiated under the leadership of the Western Black Sea Development Agency. Considering the current hunting production and the inadequacy of the existing facilities, it is evaluated that the planned investment in the fisheries preservation unit facility in Kilimli district, which has reached a more accessible position with its renewed and strengthened transportation infrastructure, will meet the need in the next 5-year projection.

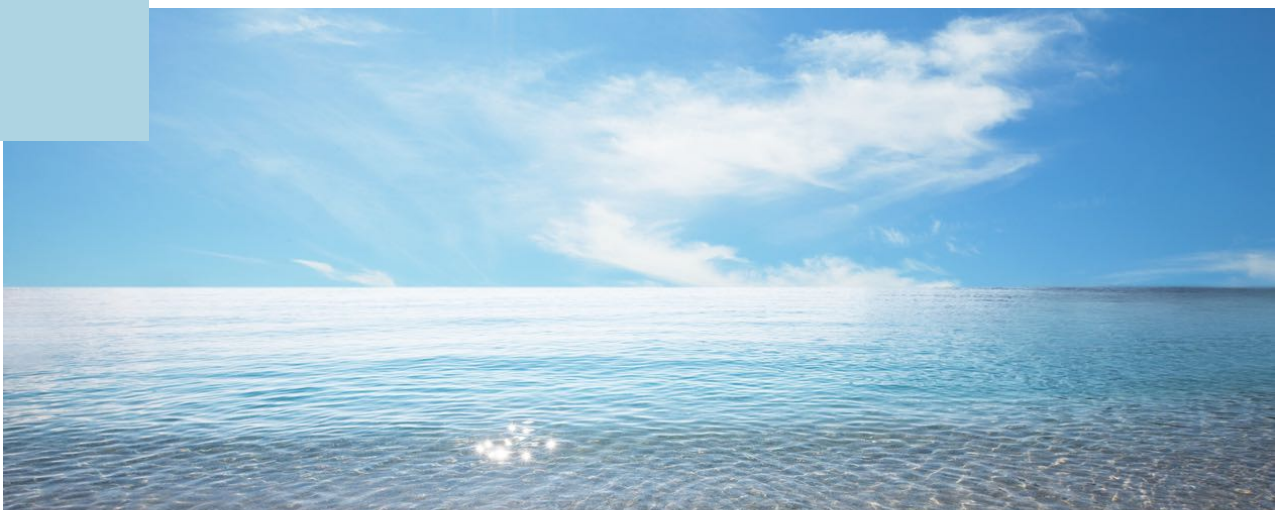
Input Market

When Zonguldak is examined in terms of fishing and aquaculture activities, it is seen that the general aquaculture production is not at the desired level. It can be said that anchovy fishing has an important potential in terms of hunting. However, this situation, which can be a high source of income, cannot be transformed into sufficient economic value due to the lack of necessary superstructures (cold storage, classification area, etc.) in fishing shelters.

In addition, the fact that fully equipped fish markets have not yet been established within the municipality borders and the deficiencies in the organizational structure and inadequate marketing cause significant losses. In this context, a significant increase in the amount of fishing in the region has not been achieved over the years. There are 5 fishing shelters in Zonguldak. The districts where fishing shelters are located and the names of the coastal structures are shown in Table-9.

Zonguldak Province Shelters (District)	Fishing Name of the coastal structure	Class
Alaplı	Alaplı	Fisherman's Shelter
Çaycuma	Filyos	Fisherman's Shelter
Kilimli	Kilimli	Fisherman's Shelter
Kdz Ereğli	Ereğli (Bozhane)	Fisherman's Shelter
Merkez	Kozlu	Fisherman's Shelter

Kaynak: Tarım ve Orman Bakanlığı, 2022



Zonguldak has a sea coastline of approximately 80 km. The amount of fish discharged according to the landing points was 15,182 tons in 2021. Anchovy came first with 8,211 tons, while horse mackerel came second with 5,094 tons. Coastal fishing activities are at the forefront in Zonguldak. In addition to the inadequacy of economic conditions, the ban on trawling in the region also has an effect on this situation. According to the data obtained from the Kilimli Agriculture and Forestry District Directorate, the catch amounts in Zonguldak by year are shown in Table 10. When the data is examined, it is seen that there has been a significant decrease in the catch amounts in the last 5 years.

Zonguldak Province Aquatic Products Production Quantity (Year)	Total Amount (Tonnes)
2017	327.629
2018	11.431
2019	6.735
2020	12.579
2021	15.182

Sea Transportation

Maritime Transportation and Shipbuilding Sector Maritime transportation emerges as an alternative in terms of relieving the pressure on railway and road transportation and in terms of cost efficiency (Öztürk et al., 2017: 62). More than 80% of Turkey's trade is carried out by sea. Transportation can have a share of around 0.3% in passenger transportation and 5% in freight transportation in total transportation (Erdoğan and Çetin, 2021: 5). Turkey's maritime foreign trade transportation decreased in 2020 compared to 2019 (Republic of Turkey Ministry of Transport and Infrastructure, 2020: 467). Turkey has an important place in freight transportation on sea routes with its 8,333 km coastline and 180 ports. With its strategic location in the Mediterranean, Aegean and Black Sea regions, Turkey serves as a commercial bridge between Asia, Europe and Africa. The ports in the Marmara Sea play an important role in Turkey's maritime transport trade (Erdoğan and Çetin, 2021: 5). Export data by mode of transport between 2013- 2020 are given in Table 2. As can be seen from the table, the share of maritime transport has the highest share among transport routes compared to railways, land, air and other shares.

Table: Export by Modes of Transport (2013-2020), Thousand US \$

Years	Maritime Transportation	Rail Way	Land Route	Airways	Others
2013	88.197.732	994.652	57.804.104	13.200.118	1.284.309
2014	88.900.953	964.170	61.133.176	14.388.661	1.117.902
2015	79.762.173	861.740	51.946.113	17.400.190	1.011.898
2016	80.139.270	673.816	49.537.436	17.908.782	987.696
2017	93.378.625	699.915	50.988.408	17.217.240	2.210.432
2018	108.802.681	753.544	52.222.468	14.127.905	1.262.157
2019	109.114.264	971.021	54.461.860	14.849.231	1.436.347
2020	100.907.927	1.287.765	53.127.588	12.732.561	1.581.914

Source : TÜİK (Access date : 18.05.2022).

In the "Maritime Trade" magazine published by the Chamber of Shipping, it was stated that the contribution of maritime, referred to as the "blue economy", to the general economy in Turkey is approximately 18.4 billion dollars and its share in the gross domestic product is around 2.5% (Chamber of Shipping, 2021: 32).

With the onset of the COVID-19 pandemic, the negative effects on the travel, transportation and consumption habits of the country's economies as well as production activities and supply chains have also caused a decrease in global maritime trade. Maritime transportation in Turkey was affected by the COVID-19 pandemic in 2019-2020, especially in May. While a total of 41,963,593 tons were handled in foreign trade, cabotage and transit cargo in May 2019, 37,840,418 tons were handled in 2020. There was an 18.24% decrease in transit cargo in May, and the total decrease in May, including other types of cargo, was 49.39% (Oğuz, 2021).

Maritime transportation plays an important role in global trade and economy, but it also has negative environmental impacts such as greenhouse gas emissions, air pollution, submarine noise, exotic species and oil pollution, and such factors lead to global warming, extreme weather events and sea level rise. In addition, other factors that cause marine pollution are; dirty water, garbage and other various wastes left or thrown from ships. In this context, it is important to develop policies to prevent ships from polluting the seas and ports and to implement innovative, smart and environmentally sustainable solutions to combat pollution (European Environment Agency, 2021: 12-15; <https://www.eea.europa.eu>; Özdemir, 2012: 382; Abdullahzade, 2009: 695). Keeping the seas clean is important for a clean environment. Therefore, inspections must be carried out completely (Yaman and Caka, 2016: 673). However, since shipbuilding, maintenance, repair and dismantling activities can have negative effects on both workers and the environment, it is important to further develop and effectively implement regulations to take measures within the framework of possible risks that may arise.

SeaTourism

Marine Tourism Marine tourism, which covers all tourism activities related to the sea and coasts, can be expressed as "the totality of commercial relations in which individuals use yachts, boats, cruises, etc. for their resting, entertaining, traveling, etc. activities, and in this context, seas, coasts, and islands are also evaluated as natural touristic supply data" (Martínez Vázquez et al., 2021: 2; Muslu, 2015: 31). Orams (1999) defined marine tourism as "entertainment and recreational activities that involve a person traveling to a place far from their place of residence and performing recreational activities in the marine environment" (Sürme and Dağlıoğlu, 2019: 378). Coastal and marine tourism is among the largest of the blue economy sectors. Turkey is among the countries preferred for marine tourism due to its natural beauties and cultural diversity, as well as its climate, and it is in a favorable position for marine tourism thanks to its long coasts, clean sea and beaches, natural and historical attractions, and suitable climate conditions. The coastline of Turkey's coastal provinces is 8,333 km and the Mediterranean and Aegean regions are especially popular worldwide (Göksu and Atik, 2016: 90; Kozan et al., 2014: 117; UNCTAD,

2020: 2). However, the Aegean and Mediterranean bays, the Bosphorus and the Islands are among the important destinations for yacht tours (Akay, 2020: 3054). The number of cruise ships in Turkey was 307 in 2017, 247 in 2018, 344 in 2019, 5 in 2020 and 78 in 2021. The number of cruise passengers was 306,485 in 2017, 213,771 in 2018, 300,896 in 2019, 1,824 in 2020 and 45,362 in 2021 (<https://denizcilikistatistikleri.uab.gov.tr>). In 2016, there were 1,537 Turkish-flagged and 608 foreign-flagged yachts, in 2017, 1,557 Turkish-flagged and 312 foreign-flagged yachts, in 2018, 1,571 Turkish-flagged and 251 foreign-flagged yachts, and in 2019, 1,819 Turkish-flagged and 160 foreign-flagged yachts with tourism operation certificates (<https://yigm.ktb.gov.tr>). While yachts with Turkish flagged tourism operation certificates increased between 2016 and 2019, there was a decrease in yachts with foreign flagged tourism operation certificates (Akay, 2020: 3057).

Approximately 20% of tourism revenues in Turkey come from marine tourism revenues. While Turkey's marine tourism revenue was 1.9 billion dollars in 2002, it reached 6.8 billion dollars in 2014. However, it decreased in 2015, 2016 and 2017 and was 3.2 billion dollars in 2017 (Chamber of Shipping, 2019: 3). While Turkey's tourism revenue was 5.9 billion US dollars in 2018, it was 7.2 billion dollars in 2019. In 2019, Turkey ranked 4th in Europe and 6th in the world with 51.2 million tourists compared to other countries. However, the measures and restrictions implemented within the scope of the COVID-19 pandemic that emerged in 2019 also affected the tourism sector.

There have been declines in the tourism sector in Turkey, which is one of the sectors most affected by the COVID- 19 pandemic. Turkey's overall tourism revenues decreased by 65.1% in 2020 compared to the previous year. In 2020, marine tourism revenue was 2.6 billion dollars. A total of 15.9 million visitors came to Turkey in 2020. 12.7 million of these visitors were foreign visitors and 3.2 million were citizens residing abroad. There was a decrease of 71.74% in the number of foreign visitors and 51.71% in the number of visitors residing abroad, a total of 69.2% compared to the previous year (Chamber of Maritime Commerce, 2021: 202-206).

The length of the Turkish coastline is approximately 8,500 km. The longest coastline is the Aegean Region with 2,805 km (one-third of the Turkish coast). The total coastline length of the Black Sea Region is 1,550 km, 80 km of which is in Zonguldak and 59 km in Bartın.

The sea-sand-sun trio in Turkey is one of the most preferred and demanded tourism types. Coastal and marine tourism has significant and great potential for the Turkish economy, but it can also have environmental and social impacts and, if not managed sustainably, can lead to environmental degradation, destruction and, as a result, loss of ocean habitats. Human pressures on coastal areas can cause the deterioration of the natural structure of the coast and the depletion of natural resources (Dinçer et al., 2018; Sharma and Sharma, 2020: 723).

Marine tourism is among Turkey's important advantages and has the potential to create employment. Therefore, in order to increase the shares that can be obtained in this sector, the right strategies should be followed and the protection of marine and coastal areas should be taken into consideration.

Marine tourism is an important subcomponent of maritime trade. Professional activities carried out with sea vehicles at sea for tourism purposes and other professional activities that directly support it are defined as maritime tourism. Maritime tourism is one of the most demanded tourism branches in Turkey. Maritime tourism consists of two basic components: maritime tourism vehicles and maritime tourism facilities (IMEAK, 2013). Cruise tourism is a type of tourism that constitutes an important segment of the tourism industry today and includes a holiday concept based on sea voyages. This type of tourism, which is usually carried out with luxury ships, offers passengers the opportunity to make sea voyages while also providing the advantage of discovering different destinations and stopping at several different ports.

The Black Sea cruise industry is poised to grow due to its unique cultural heritage, natural beauties and the increasing demand for alternative cruise destinations. Although challenges such as political concerns and infrastructure limitations continue, strategic investments, collaboration efforts and effective marketing can unlock the full potential of the industry. Using these factors, the Black Sea cruise industry can be positioned as an attractive option for both regional and international cruise passengers. Amasra, one of the most beautiful cruise areas for cruises, is within the borders of Bartın Province. In order to develop the right strategies for Amasra cruise tourism development efforts and to evaluate the views of tourism stakeholders, the Amasra Cruise Workshop was organized on 28.09.2023. As a result of the workshop, it was decided to support Amasra for cruises.

Use of Innovative Technologies and Sustainability Analysis in the Black Sea Region Blue Economy Sectors

The Black Sea Region is one of the regions with the highest blue economy potential in Turkey. Sectors such as fishing, aquaculture, maritime transportation, marine energy and coastal tourism make significant contributions to the regional economy. However, the sustainability and competitiveness of these sectors depend on the use of innovative technologies and sustainability practices. This section of the report aims to analyze the sustainability practices of businesses in the sector by evaluating the innovative technologies used in the blue economy sectors in the Black Sea Region.

Use of Innovative Technologies

Although some innovative technologies have started to be used in the blue economy sectors in the Black Sea Region, we are not yet at the desired level in terms of dissemination. In particular, applications such as closed-circuit systems, automation and sensor technologies are seen in aquaculture. In fishing, GPS tracking systems and sonar technologies that detect fish density are used. In maritime transportation, research is being conducted on topics such as autonomous ship technologies and the use of environmentally friendly fuels.

Innovative technologies in aquaculture

Closed Circuit Systems: A fish farm operating in the Milas district of Muğla uses a closed circuit system to raise sea bass. In this system, water is continuously filtered and oxygenated, allowing the fish to live in a healthier environment. In addition, parameters such as water temperature and salinity are constantly monitored to create optimum conditions. In this way, the growth rate of the fish has increased and disease rates have decreased.

Fishing

Satellite-Based Tracking Systems: A fishing cooperative operating in Sinop has made fishing operations more efficient by installing satellite-based tracking systems on fishing boats. These systems track where and what type of fish fishermen are catching in real time. This allows for better determination of fishing areas and prevention of overfishing. In addition, in emergencies at sea, fishermen can be quickly located and help can be sent.

Marine Energy

Wind Energy: In areas with high wind potential, such as Rize's Firtina Valley, small-scale wind turbines are installed to generate electricity. These turbines meet the energy needs of coastal villages and also provide additional income to the region.

Other Potential Case Studies

- **Smart Buoys:** Smart buoys are used for many purposes, such as tracking fish migration routes, measuring water temperature and salinity, and detecting marine pollution.
- **Autonomous Underwater Vehicles:** Autonomous underwater vehicles are used to examine seabed creatures and marine ecosystems.
- **Energy Efficient Ships:** Hybrid or electric engine systems are used to increase the energy efficiency of ships used in maritime transportation.

Application Examples of Innovative Technologies in Türkiye and Especially in the Black Sea Region

Various studies on the implementation of technologies that will support the blue economy in Turkey and especially in the Black Sea Region have started to increase in recent years. However, some of these studies are still being implemented as pilots or continue as small-scale projects.

The Black Sea Region attracts attention with its natural beauty, rich biodiversity and energy potential. This potential can be further increased with the use of innovative technologies. There is great development potential especially in the aquaculture, marine energy and tourism sectors. Examples of these studies are given below.

Aquaculture

- **Smart Hatchery Systems in Rize:** A fish farm operating in Rize raises salmon fry using smart hatchery systems that automatically adjust water temperature and oxygen levels. This has reduced fry mortality and increased production efficiency.
- **Artificial Intelligence-Assisted Feeding Systems in Trabzon:** A trout farm in Trabzon uses an artificial intelligence-assisted system to determine the amount of feed according to the growth rate and nutritional needs of the fish. This system constantly monitors the weights of the fish and creates the most appropriate feeding plan.

Fisheries

- Autonomous Underwater Vehicles in Sinop: Sinop University Faculty of Fisheries is developing autonomous underwater vehicles to examine fish stocks in the depths of the Black Sea. These vehicles are also used for different purposes such as measuring marine pollution and examining the marine ecosystem.
- Remote Controlled Fishing Boats in Samsun: Some fishermen operating in Samsun use remote control boats to catch small fish, especially in stormy weather. This increases both work safety and saves fuel.

Marine Energy

- Wave Energy Pilot Project in Giresun: A small-scale pilot project was carried out in a region close to the coast in Giresun to convert wave energy into electrical energy. This project is considered an important step in terms of evaluating the wave energy potential in Turkey.
- Wind Energy Plants in Rize: Wind energy plants are being established by local and foreign investors on the coastline of Rize, especially in regions with high wind potential such as Firtina Valley.

Coastal Protection Systems

- Geo-Bags in Samsun: Artificial reefs were created using geo-bags to prevent coastal erosion in Samsun. In this way, the coastline was protected and new living spaces were created for marine life.
- Plant Coastal Protection Systems in Trabzon: In some regions in Trabzon, a natural barrier was created by planting local plant species to strengthen the coastline. This method both prevents erosion and preserves the aesthetic appearance of the coasts.

Obstacles and Solution Suggestions

- Finance: The high cost of innovative projects is the biggest obstacle. State support, investment incentives and private sector investments are important in overcoming this problem.
- Technological Infrastructure: The lack of necessary infrastructure in the region makes it difficult to implement technologies. Infrastructure investments such as laying fiber optic cables in coastal areas and accelerating internet access are important.
- Legislation: Legislation regulating the use of innovative technologies should be updated and bureaucratic processes should be simplified.
- Qualified Workforce: Through university-industry collaboration, young people growing up in the region should be trained in innovative technologies and a qualified workforce should be attracted to the region.

Challenges in the Application of Innovative Technologies in the Black Sea Region

It is obvious that the spread of innovative technologies in the Black Sea Region is closely related to the geographical and economic structure of this region, the characteristics of the sectors and the deficiencies in the technology ecosystem in Turkey in general.

High Investment Cost

High investment cost is one of the most important challenges. The economic contraction and high inflation experienced all over the world, especially after the COVID19 pandemic, have also increased investment costs. Especially the high inflation seen in Turkey after 2023 has slowed down existing investments and brought new investments to a halt. State-supported investments continue to be supported in order of priority. However, investments by private enterprises have decreased considerably. However, examples of practices are shown below.



- **Aquaculture:** The installation and operating costs of technologies such as closed-circuit systems, smart hatchery systems, and artificial intelligence-supported feeding systems are quite high. This investment creates a large financial burden, especially for small-scale businesses. For example, when a fish farm operating in Trabzon wanted to install a closed-circuit system, it had to make a significant investment due to its high energy consumption and special equipment needs.
- **Marine Energy:** The installation costs of wave and wind power plants are quite high. Therefore, such investments are generally considered risky, especially for small and medium-sized businesses. For example, a company that wanted to install a wind power plant in Rize had difficulty finding project financing due to the high initial cost.

Lack of Education

In today's global competitive environment, information and information technologies are becoming increasingly important, and countries are becoming information societies with the impact of rapidly developing technology and globalization. Access to information is possible through education.

The education of individuals also plays an important role in accelerating scientific and technological innovations. Education is also extremely important for improving the quality of human capital, which is one of the most important resources of countries for sustainable growth. In this context, education is one of the most important factors that play a role in the economic, social and cultural development of countries. As the education levels of individuals increase, the need for qualified labor is met, labor productivity increases, and scientific and technological innovations gain momentum. Therefore, one of the most important differences between developed and underdeveloped countries is the human force that is trained in every way. It is a fact that training qualified human force contributes greatly to economic development. Net schooling rates are an important indicator showing the educational status of the young population, which is extremely important for our country's economy.

- **Fishing:** Many fishermen in the Black Sea Region fish using traditional methods. These fishermen lack sufficient knowledge on topics such as autonomous underwater vehicles, remote-controlled boats, and fish stock management. This slows down the adoption of new technologies.
- **Aquaculture:** Aquaculture farmers are generally trained in agriculture or aquaculture. They need additional training in topics such as artificial intelligence, data analysis, and automation systems. For example, a fish farm operating in Sinop has provided special training to its employees to effectively use the smart hatchery system.

Legislative Deficiencies

Regardless of the level of development and economic structure, the state's intervention in the economy, its duty to regulate and supervise the economy has never disappeared, and in addition to basic intervention areas such as full employment, price stability, economic growth, elimination of market disruptions and reduction of income distribution, the state has also undertaken other duties. In today's conditions, state aids/incentives, which are implemented in different ways in all countries and basically aim to solve economic and social problems quickly and dynamically, constitute one of the public's indirect intervention tools in the market mechanism, perhaps the most important one. In this study, the subject of incentives is investigated not as a fiscal policy tool used by the state in intervening in the economy, but as its effect on macroeconomic performance.

Although globalization, opening up to the outside world, international and regional economic unions have brought new restrictions to the incentive system, they have never been eliminated, only the forms of support have changed. The gains obtained through incentives are not limited to the sector or company that is incentivized, but have had positive effects on the general economy. As seen in many countries around the world such as Ireland, the Czech Republic, Poland, Germany and South Korea, countries that have implemented successful incentive systems have been able to achieve their economic development thanks to this. Due to this importance, incentives are the basic tools of foreign trade policy/economic policy. The basis of incentives, whether investment or export, is to increase the welfare level of the people by directing scarce resources for the benefit of the country's economy in the long term (Undersecretariat of Treasury, 2003: 126).

In addition, thanks to incentives used in different ways, the intensity of domestic and foreign-based cyclical fluctuations is reduced, the duration of fluctuations is shortened and the negative effects on the economy are mitigated. Again, incentives are a policy tool used in more specific areas such as ensuring regional development, increasing Research and Development (R&D) capacity and developing new technologies, increasing the competitiveness of firms, and protecting the environment, in addition to achieving basic macroeconomic goals such as production, employment and export. With these versatile and different areas of use, incentives are seen as a tool for achieving socio-economic goals such as reducing regional imbalances, preventing market distortions, improving the quality of life, and supporting sustainable growth and social development. Finally, incentives cause inflation by increasing the volume of credit in the economy and increasing the level of spending.



- **Marine Energy:** Since the marine energy sector is still new in Turkey, there are insufficient regulations specific to this sector. This situation causes investors to remain uncertain and delays investments. For example, when a company wanted to establish a wave energy power plant in the Black Sea, it had to postpone its investment decision due to the long and complicated licensing processes.
- **Coastal Protection:** There is no clear legislation regarding the establishment and use of structures such as artificial reefs and geo-bags used to prevent coastal erosion. This situation makes it difficult to implement coastal protection projects. For example, a municipality carrying out a coastal protection project in Samsun experienced delays in the project due to different opinions of different institutions.

Regional Position

While the use of innovative technologies is more widespread throughout Turkey, especially in large cities and industrial areas, the Black Sea Region is also taking important steps in this area. The region's universities and research institutions are conducting important studies on the development and application of innovative technologies. However, the region's geographical characteristics, economic structure and infrastructure status are important factors affecting the spread of technologies.

It is quite difficult to invest in the Black Sea region, which receives high amounts of rainfall. This increases the risk of erosion and emphasizes the importance of coastal protection systems.

Stormy weather conditions are quite difficult compared to other regions. For this reason, maritime transportation is not very developed. However, marine energy projects are quite suitable due to high wave action. It requires the use of more durable systems in marine energy projects. This is an important issue that increases costs.

Stakeholder Mapping

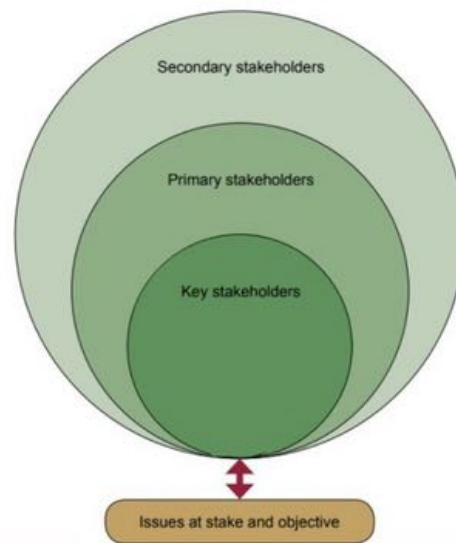
Stakeholder analysis enables us to systematically look at all of these questions at the beginning of a research project. By knowing who might benefit, who might lose out, who might block us and who can help us achieve our goals, we become empowered to work effectively with all of these groups to adapt our research to the needs and priorities of those who care most about what we are doing. It may seem self-evident that all the relevant stakeholders should be identified prior to any attempt to engage.

Categories of actors within stakeholder maps are:



Key actors	Actors who are able to use their skills, knowledge or position of power to significantly influence the project.
Primary actors	Actors who are directly affected by the project, either as the designated beneficiaries or because they stand the chance to gain or lose power and privilege as a result of the Project (Users/Beneficiaries...)
Secondary actors	Actors whose involvement in the project is only indirect or temporary, such as service providers (NGOs, Local authorities, Research institutions, School and universities, Businesses)

Stakeholder map



Potential Stakeholders		
Local Governments	Zonguldak Municipality	<p>Roles: Legal support for the project, providing infrastructure, allocating resources to young entrepreneurs.</p> <p>Interests: Economic development, increasing the local workforce, encouraging youth employment.</p> <p>Impacts: Promoting sustainable projects in regional planning, leadership role in blue economy development</p>
	Kozlu Municipality	
	Kilimli Municipality	
	Çatalağzı Municipality	
	Muslu Municipality	
	Saltuova Municipality	
	Zonguldak Governorship	
	Bartın Governorship	
Karabük Governorship		
Fishing Cooperatives	Kozlu Fishing Cooperatives	<p>Role: Encouraging youth participation in innovative fishing technologies.</p>

	Kilimli Fishing Cooperatives	Interests: Sustainable fishing practices, conservation of fish stocks. Impact: Modernization of cooperatives, more competitive fishing sector.	
Universities, Research Centers and VET Schools	Zonguldak Bülent Ecevit University	Roles: Education, research and development activities, providing training for young people on the blue economy.	
	Zonguldak Teknopark Research Center		
	TOBB University of Economics and Technology	Interests: Scientific development, national and international cooperation.	
	Energy Application and Research Center	Impact: Increased technology transfer, research and innovation capacity.	
	Zonguldak Vocational (VET) High School		
	Bartın University		
	Karabuk University		
Port Operations and Shipyards	Zonguldak Liman İşletmesi	Roles: Integrating young people into the maritime and logistics sector, adaptation to new shipbuilding technologies.	
	Kdz. Ereğli Liman İşletmesi		
	Alaplı Liman İşletmesi		
	Filyos Liman İşletmesi	Interests: Modern port infrastructure, more efficient logistics networks, economic growth.	
	Eren Enerji Liman İşletmesi		
	Ereğli Shipyard		
	Usta Mehmetoğlu Shipping Yacht Inc.		Impacts Development of international trade, increased competitiveness of ports.
	Med Yılmaz Shipping Industry And Trade Inc.		
	Demir Shipyard Ind. And Trade Co. Ltd.		
	Madenci Shipyard Ind. Ltd. Co.		
	Usmed Ship Building Ind. And Trade Co. Inc.		
Civil Society Organizations	Paydas Education Culture and Art Association	Roles: Ensuring youth participation in environmental awareness and marine ecosystem protection projects.	
	Atlas Education Information Technologies and Youth Association		

	Zonguldak Province Young Entrepreneurs	Interests: Expansion of marine and environmental protection activities, increasing public awareness. Impacts: Acceleration of sustainable development goals in the region, increasing the influence of NGOs.
	Zonguldak Young Entrepreneurs And Businessmen Association	
	Kozlu Fisheries Cooperative	
	Kilimli Fisheries Cooperative	
Renewable Energy Companies	Eren Enerji	Roles: Involving young workforce in offshore wind and other renewable energy projects. Interests: Expansion of renewable energy projects, more environmentally friendly energy production.
	Arel Environmental Investments Energy and Electricity Production Ltd. Co.	
	OEN Energy Group	Impacts: Security of energy supply, increasing potential for region to become green energy hub.
	MIA Technology	

Type of organisation / Level	Local	Regional	National	International and European	Total
VET Institutions	1				1
HEIs			4		4
Gorverments	6	3			9
NGOs	4	1	1		6
SMEs	1529	5			1534
Emploee	29000+				29000+
Local Authorities	6	3			9
Research Centers	2				2
Students	120000+				120000+
Teachers	102				102
Academic person	10000+				10000+
Chamber of Commers	124		1		125
Labor Market- Bussiness		1			1
Employment Agency		1			1
Energy Company	4				4
Fishing Cooperatives	2				2
Port Operations and Shipyards	12				12

4.2.1 Overview of the Blue Economy in Türkiye

The Blue Economy in Turkey represents a critical axis of sustainable development, leveraging the nation's extensive marine and coastal resources for economic growth and environmental resilience. With its unique geographic position at the crossroads of Europe, Asia, and Africa, Turkey is endowed with access to three seas—the Black Sea, the Aegean Sea, and the Mediterranean Sea—each offering distinct opportunities across diverse sectors. By integrating sustainability into marine resource management, Turkey seeks to align economic imperatives with global environmental priorities.

Fisheries and aquaculture constitute fundamental components of Turkey's blue economy, contributing significantly to food security, employment, and trade. The Black Sea region, a focal point of these activities, has historically been a hub for species such as anchovy, bonito, and horse mackerel. Over recent years, Turkey has made significant advances in aquaculture, transitioning from conventional fishing practices to modern, technology

driven methods. Open-sea cage systems and artificial intelligence-supported feed management technologies have enhanced production efficiency, while mitigating environmental degradation. However, the sector faces persistent challenges, including overfishing, pollution, climate variability, and habitat loss, which collectively threaten the sustainability of marine ecosystems. Addressing these challenges requires robust regulatory mechanisms, infrastructural investments, and targeted capacity-building programs to ensure the long-term viability of fisheries and aquaculture.

Maritime transportation plays a pivotal role in Turkey's economic landscape, facilitating over 80% of its international trade through a strategically positioned network of ports. As a crucial node in global logistics, Turkey connects vital trade routes spanning Europe, Asia, and Africa. Despite disruptions caused by global economic shifts and the COVID-19 pandemic, the maritime sector remains resilient. Recent efforts have focused on incorporating environmentally sustainable practices, such as the adoption of energy-efficient ship designs, alternative fuel systems, and advanced logistics management solutions.

Additionally, the exploration of autonomous maritime technologies underscores Turkey's commitment to maintaining competitiveness in the rapidly evolving global maritime industry.

The potential for renewable energy development in Turkey's marine environment is both substantial and transformative. Coastal regions characterized by high wind and wave energy potential offer significant opportunities for diversifying the country's energy portfolio. Pilot projects, such as wave energy initiatives in Giresun and wind energy developments in Rize, exemplify nascent efforts to harness marine resources for sustainable energy production. However, the financial and regulatory barriers to scaling these technologies remain formidable. The establishment of clear legislative frameworks and the mobilization of public-private partnerships are imperative for fostering innovation and accelerating the deployment of marine renewable energy systems.

Coastal and marine tourism, as one of the largest contributors to the blue economy, underscores Turkey's unique cultural and environmental assets. The country's diverse coastline attracts millions of visitors annually, particularly to the Aegean and Mediterranean regions, which are globally recognized for their pristine beaches and historical landmarks. Meanwhile, the Black Sea region remains underdeveloped yet offers untapped potential for niche tourism, including cruise and ecotourism. However, the expansion of tourism activities poses risks of environmental degradation, habitat loss, and socio-cultural disruption. Sustainable tourism practices, emphasizing eco-friendly infrastructure, community engagement, and comprehensive resource management, are essential to preserving the integrity of Turkey's coastal ecosystems and cultural heritage.

Despite its immense potential, Turkey's blue economy faces structural and systemic challenges.

Insufficient infrastructure, high costs of technological adoption, and fragmented regulatory frameworks hinder the effective utilization of marine resources. Additionally, a shortage of specialized labor and limited public awareness about the principles of the blue economy constrain sectoral innovation and development. These issues necessitate a coordinated approach involving policy harmonization, investment in advanced technologies, and the cultivation of a skilled workforce. Enhanced collaboration between governmental institutions, private enterprises, and academic research bodies is critical to fostering sustainable growth.

Essentially, Turkey's blue economy embodies a promising paradigm for integrating economic development with environmental conservation. By addressing systemic barriers and leveraging its strategic geographic and resource endowments, Turkey can establish itself as a global leader in sustainable marine economy practices. This requires a sustained commitment to innovation, policy coherence, and multilateral partnerships to ensure the effective stewardship of marine resources. Through these efforts, Turkey can contribute meaningfully to global sustainability objectives while achieving economic resilience and social equity.

4.2.2. Key Stakeholders in Türkiye

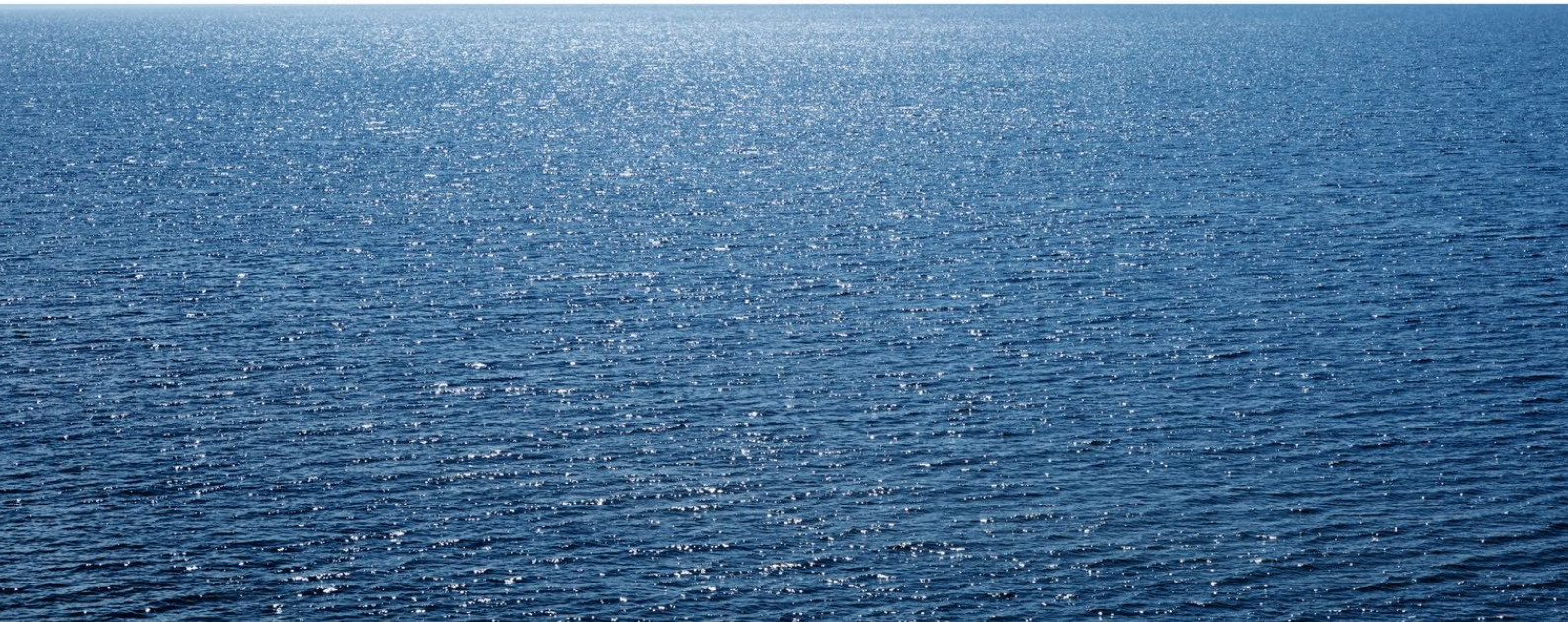
The development and sustainability of Turkey's Blue Economy depend significantly on the active involvement and collaboration of key stakeholders across various sectors. These stakeholders play diverse yet interconnected roles in fostering economic growth, ensuring environmental conservation, and promoting technological innovation within the framework of the Blue Economy. Their contributions are vital for the successful integration of sustainable practices and for addressing the multifaceted challenges associated with marine and coastal resource management.

Local and regional governments are pivotal in providing the regulatory and infrastructural support necessary for the growth of Blue Economy sectors. Municipalities and local administrations, such as those in Zonguldak, Bartın, and Karabük, play a critical role in fostering sustainable projects, facilitating resource allocation, and integrating youth and local communities into Blue Economy initiatives. These governmental entities also contribute to regional planning and provide legal frameworks that enable the adoption of innovative technologies and practices.

Fishing cooperatives represent another essential group of stakeholders. These organizations, such as the Kozlu and Kilimli Fishing Cooperatives, are instrumental in promoting sustainable fishing practices and conserving marine biodiversity. By encouraging the use of innovative fishing technologies and improving organizational structures, these cooperatives enhance the competitiveness of the fishing sector while addressing challenges such as overfishing and environmental degradation.

Academic institutions, research centers, and vocational education and training (VET) schools constitute a cornerstone of innovation and capacity building in the Blue Economy. Universities, including Zonguldak Bülent Ecevit University, Bartın University, and Karabük University, engage in education, research, and development activities, offering scientific insights and fostering national and international collaborations. These institutions also provide specialized training programs to equip youth with the knowledge and skills required to excel in various Blue Economy sectors, thereby addressing the demand for a qualified workforce.

Port operations and shipyards play a crucial role in enhancing Turkey's maritime infrastructure and logistics networks. Ports such as those in Zonguldak and Ereğli, along with shipyards like Demir Shipyard, contribute to the modernization of maritime trade and logistics.



These stakeholders facilitate the integration of youth into the maritime and logistics sectors and promote the adoption of advanced shipbuilding technologies. Their involvement strengthens Turkey's position in international trade and supports the broader objectives of the Blue Economy.

Civil society organizations (CSOs) are indispensable for fostering public awareness and community engagement in Blue Economy activities. Organizations such as the Paydaş Education, Culture, and Art Association work to increase public understanding of marine ecosystem protection and environmental sustainability. These CSOs are critical in accelerating the achievement of sustainable development goals in the region by involving local communities in conservation efforts and innovative projects.

Renewable energy companies represent a burgeoning segment of stakeholders, contributing to the diversification of Turkey's energy portfolio. Companies such as Eren Enerji and OEN Energy Group are actively involved in offshore wind and other renewable energy projects, promoting environmentally friendly energy production. By collaborating with local and international partners, these stakeholders help position Turkey as a green energy hub while creating new economic opportunities in marine energy.

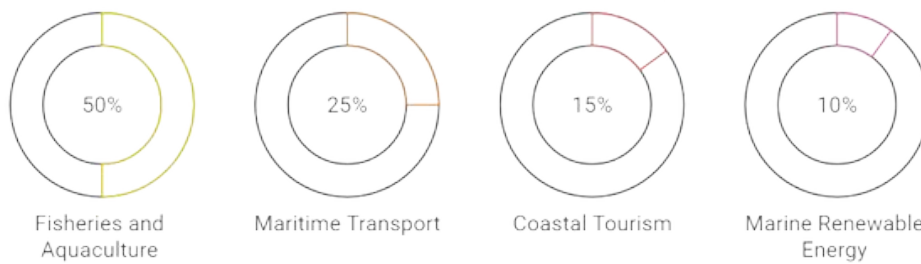
Finally, stakeholders from the private sector, including small and medium-sized enterprises (SMEs), play a multifaceted role in supporting the Blue Economy. SMEs contribute through investments in innovative technologies and sustainable practices across sectors such as fisheries, aquaculture, and coastal tourism. Their engagement not only boosts economic activity but also ensures the dissemination of sustainable and efficient practices.

The successful implementation and expansion of Turkey's Blue Economy rely on the effective coordination of these stakeholders. By fostering collaborative networks and aligning their efforts with national and international sustainability goals, these actors can collectively contribute to the responsible stewardship of marine resources, economic resilience, and environmental preservation. Their collective engagement is pivotal in transforming Turkey's vast marine and coastal assets into a robust and sustainable economic engine.

4.2.3. Questionnaire (Türkiye)

1. Which sector of the blue economy is most developed in Türkiye's Black Sea region?
 - A) Fisheries and Aquaculture (50%)
 - B) Maritime Transport (25%)
 - C) Coastal Tourism (15%)
 - D) Marine Renewable Energy (10%)

Development Levels of Blue Economy Sectors in Türkiye's Black Sea Region

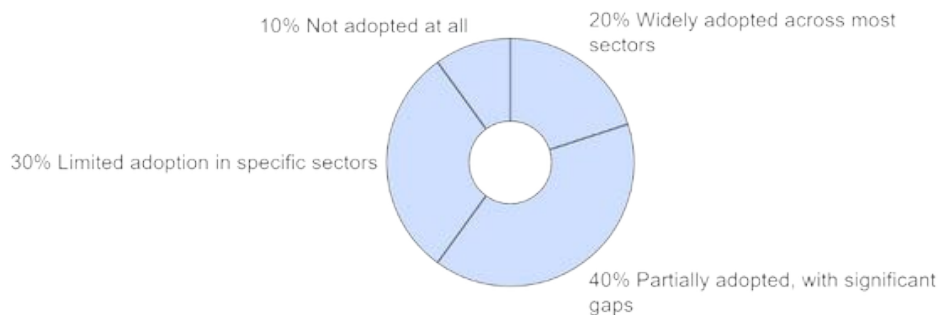


Sector Development: The dominance of fisheries and aquaculture (50%) highlights their traditional prominence in the region, with coastal tourism (15%) reflecting growing but secondary importance.

2. What is the current level of adoption of innovative technologies in Türkiye's blue economy?

- A) Widely adopted across most sectors (20%)
- B) Partially adopted, with significant gaps (40%)
- C) Limited adoption in specific sectors (30%)
- D) Not adopted at all (10%)

Adoption Levels of Innovative Technologies in Türkiye's Blue Economy

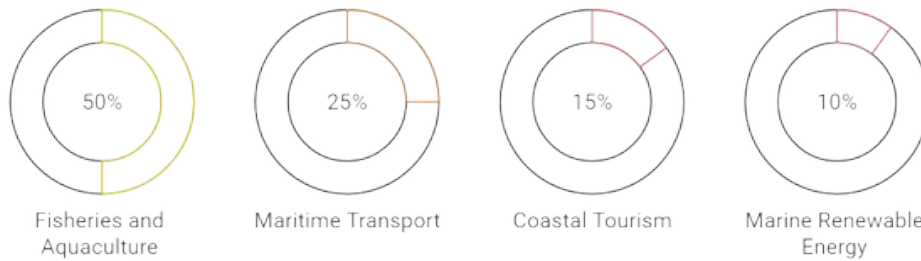


Technology Adoption: Partial adoption (40%) suggests progress but reveals significant gaps, while limited adoption (30%) indicates areas needing targeted investment.

3. What are the key barriers to sustainability for blue economy enterprises in Türkiye?

- A) Financial constraints (40%)
- B) Lack of technological innovation (30%)
- C) Regulatory challenges (20%)
- D) Low stakeholder collaboration (10%)

Development Levels of Blue Economy Sectors in Türkiye's Black Sea Region

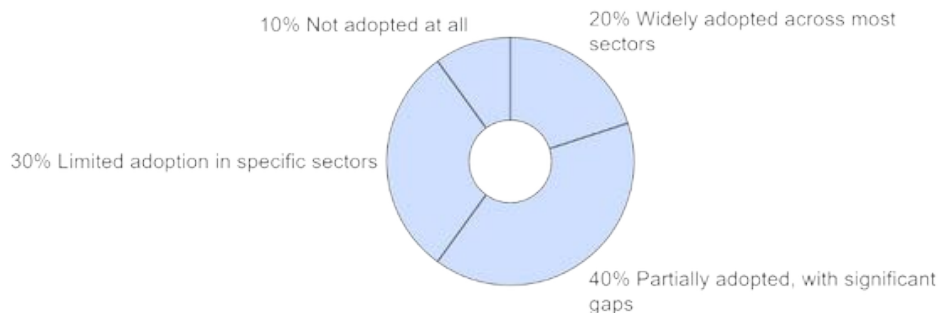


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- C) Limited adoption in specific sectors (30%)
- D) Not adopted at all (10%)

Adoption Levels of Innovative Technologies in Türkiye's Blue Economy

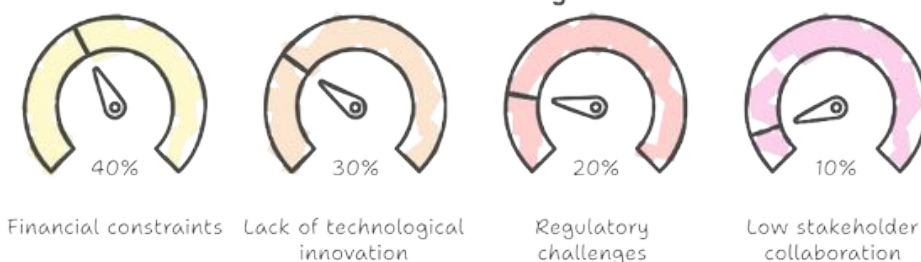


Technology Adoption: Partial adoption (40%) suggests progress but reveals significant gaps, while limited adoption (30%) indicates areas needing targeted investment.

3. What are the key barriers to sustainability for blue economy enterprises in Türkiye?

- A) Financial constraints (40%)
- B) Lack of technological innovation (30%)
- C) Regulatory challenges (20%)
- D) Low stakeholder collaboration (10%)

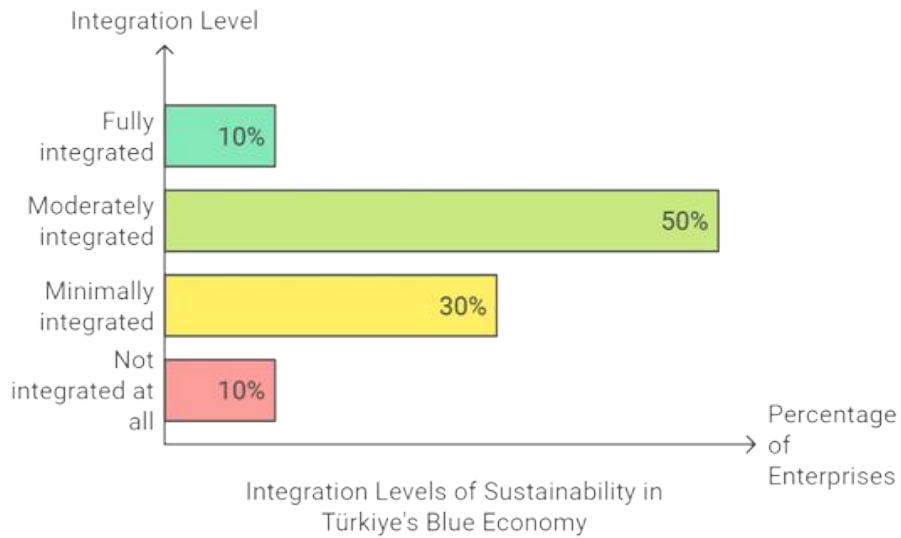
Key Barriers to Sustainability in Türkiye's Blue Economy



Sustainability Barriers: Financial constraints (40%) are a major hurdle, overshadowing regulatory challenges (20%) and low collaboration (10%), indicating a need for better financial support mechanisms.

4. How integrated are sustainability practices within Türkiye’s blue economy enterprises?

- A) Fully integrated (10%)
- B) Moderately integrated, with room for growth (50%)
- C) Minimally integrated (30%)
- D) Not integrated at all (10%)

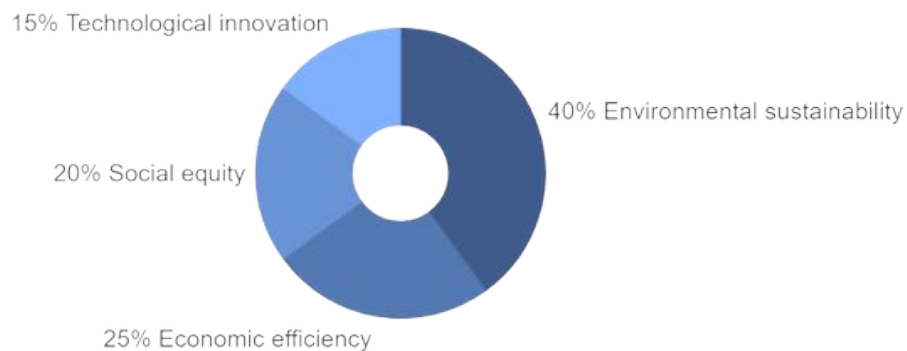


Sustainability Practices: Moderate integration (50%) suggests progress toward sustainable practices, though minimal integration (30%) points to areas requiring improvement.

5. Which area requires the most improvement in Türkiye’s blue economy practices?

- A) Environmental sustainability (40%)
- B) Economic efficiency (25%)
- C) Social equity (20%)
- D) Technological innovation (15%)

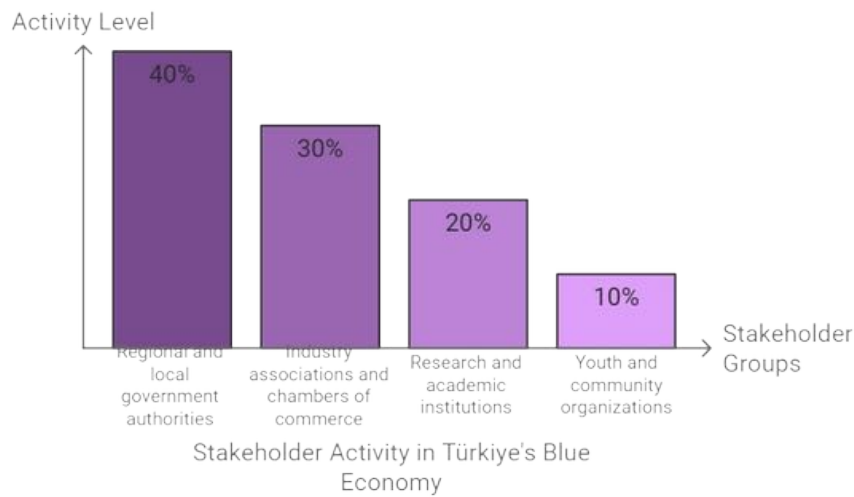
Distribution of Improvement Areas in Türkiye's Blue Economy



Improvement Areas: Environmental sustainability (40%) leads as a priority, emphasizing its importance for the region’s long-term viability.

6. Who are the most active stakeholders in Türkiye's blue economy?

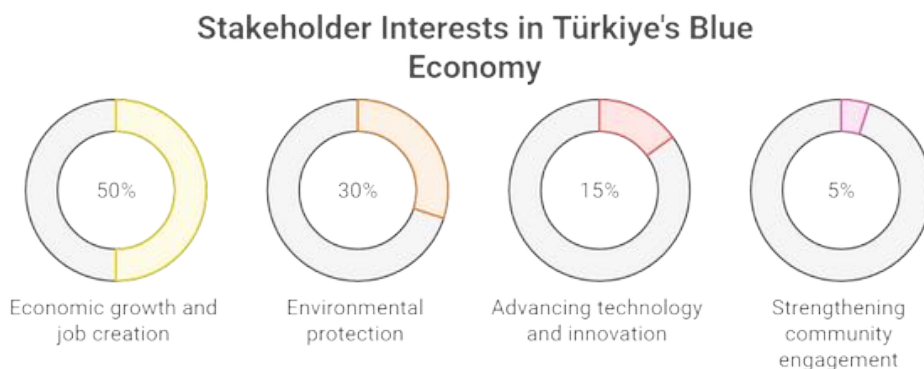
- A) Regional and local government authorities (40%)
- B) Industry associations and chambers of commerce (30%)
- C) Research and academic institutions (20%)
- D) Youth and community organizations (10%)



Active Stakeholders: Regional authorities (40%) are the most active, indicating their central role, while youth and community organizations (10%) show potential for greater involvement.

7. What is the primary interest of stakeholders in Türkiye’s blue economy?

- A) Economic growth and job creation (50%)
- B) Environmental protection (30%)
- C) Advancing technology and innovation (15%)
- D) Strengthening community engagement (5%)



Stakeholder Interests: Economic growth and job creation (50%) dominate stakeholder interests, while environmental protection (30%) reflects growing ecological concerns.

8. How would you assess the level of collaboration among stakeholders in Türkiye?

- A) Highly collaborative (15%)
- B) Moderately collaborative (40%)
- C) Limited collaboration (35%)
- D) No collaboration at all (10%)



Collaboration Level: Moderate collaboration (40%) is a positive sign, but limited collaboration (35%) highlights the need for strengthened stakeholder relationships.

9. What are the expectations of stakeholders from Türkiye’s engagement in the sustainable transnational network?

- A) Greater access to international funding (40%)
- B) Capacity-building and knowledge exchange (30%)
- C) Improved policy alignment with the EU (20%)
- D) Enhanced opportunities for youth participation (10%)



Network Expectations: Access to international funding (40%) and capacity-building (30%) emerge as the most sought-after benefits, underlining the importance of external support.

10. What is the biggest gap in stakeholder engagement in Türkiye’s blue economy?

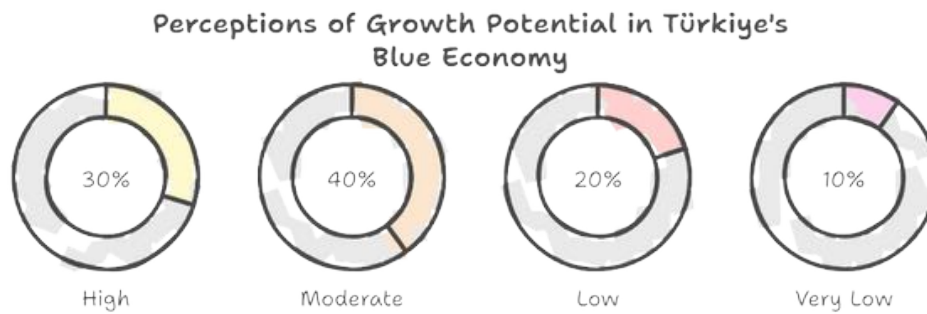
- A) Inadequate communication and coordination (40%)
- B) Lack of tailored engagement strategies (30%)
- C) Insufficient understanding of stakeholder priorities (20%)
- D) Overlapping and unclear roles (10%)



Engagement Gaps: Inadequate communication (40%) is the primary issue, while unclear roles (10%) suggest the need for better-defined stakeholder responsibilities.

11. How would you describe the potential for growth in Türkiye's blue economy?

- A) High, with untapped resources and opportunities (30%)
- B) Moderate, with some limitations (40%)
- C) Low, due to significant barriers (20%)
- D) Very low, with minimal growth expected (10%)



Growth Potential: Moderate potential (40%) reflects realistic optimism, with untapped opportunities (30%) indicating areas for strategic investment.

12. What drives sustainability efforts in Türkiye's blue economy?

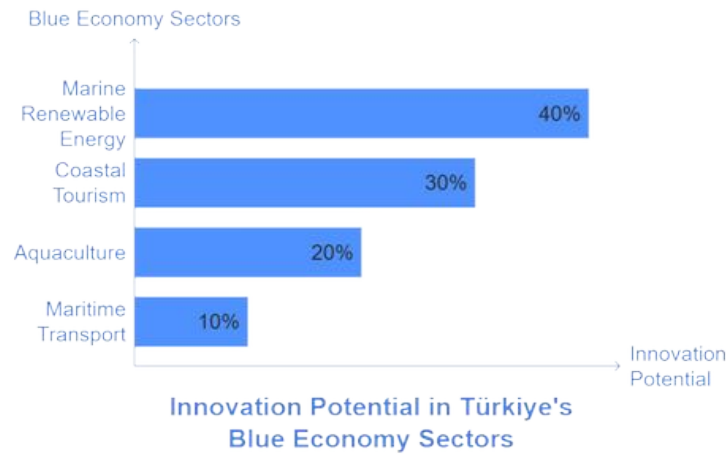
- A) Government policies and regulations (35%)
- B) Corporate social responsibility initiatives (25%)
- C) Economic incentives and international funding (30%)
- D) Community awareness and activism (10%)



Sustainability Drivers: Government policies (35%) lead, while economic incentives (30%) highlight the importance of financial motivators in driving sustainability.

13. Which blue economy sector in Türkiye has the greatest potential for innovation?

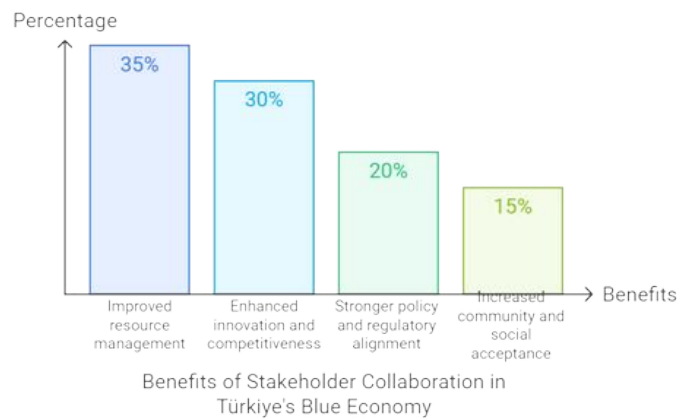
- A) Marine Renewable Energy (40%)
- B) Coastal Tourism (30%)
- C) Aquaculture (20%)
- D) Maritime Transport (10%)



Innovation Potential: Marine renewable energy (40%) stands out as the most promising sector, emphasizing its role in technological advancement.

14. What is the most significant benefit of stakeholder collaboration in Türkiye's blue economy?

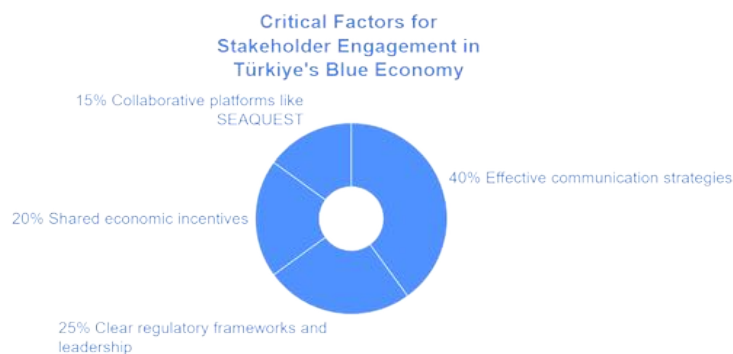
- A) Improved resource management (35%)
- B) Enhanced innovation and competitiveness (30%)
- C) Stronger policy and regulatory alignment (20%)
- D) Increased community and social acceptance (15%)



Collaboration Benefits: Improved resource management (35%) tops the list, showing the practical value of collaboration, while community acceptance (15%) highlights a less prioritized area.

15. What factor is most critical for successful stakeholder engagement in Türkiye's blue economy?

- A) Effective communication strategies (40%)
- B) Clear regulatory frameworks and leadership (25%)
- C) Shared economic incentives (20%)
- D) Collaborative platforms like SEAQUEST (15%)



Critical Factors: Effective communication strategies (40%) are the most critical, underscoring their importance in fostering successful engagement.



4.3. Bulgaria

4.3.1. Overview of the Blue Economy in Bulgaria

Bulgaria's Blue Economy is intricately linked to its geographic positioning along the Black Sea coast, playing a critical role in the country's economic and social development. Key sectors include maritime transport, fisheries, aquaculture, and coastal tourism. Additionally, emerging fields such as marine renewable energy and blue biotechnology are growing in prominence, signaling a shift toward innovation-driven development. These activities collectively contribute to Bulgaria's GDP, employment generation, and regional trade partnerships, solidifying the country's strategic importance in the Black Sea region (Marine Cluster Bulgaria, 2020; European Commission, 2021).

Economic Significance and Core Sectors

Bulgaria's Blue Economy plays a significant role in the country's economic expansion and is closely linked to its location along the Black Sea. The foundation of the industry is made up of core industries like fisheries, aquaculture, coastal tourism, and marine transportation. These industries create jobs and bring in a lot of money, especially in coastal areas. For example, Bulgaria's potential in sustainable seafood production is demonstrated by the fisheries and aquaculture industries, which meet both domestic and export demands (Marine Cluster Bulgaria, 2020; European Commission, 2021).

Millions of tourists visit Bulgaria's Black Sea resorts each year, making coastal tourism another cornerstone of the country's Blue Economy. Auxiliary businesses such as local handicrafts, transportation, and hospitality are supported by this sector. In the meantime, Bulgaria's position as a major hub in regional and global trade, linking Europe to Asia and the Middle East, is highlighted by maritime transportation, which is made possible by vital ports like Varna and Burgas (World Bank, 2020).

Fisheries and Aquaculture

The fisheries and aquaculture sectors are foundational to Bulgaria's maritime economy. These industries supply both local markets and international exports, showcasing their economic importance. The aquaculture industry, in particular, has been growing, with farms producing high-quality freshwater and marine species such as trout, carp, and mussels.

This aligns with Bulgaria's efforts to meet global demand for sustainable seafood, which is crucial for food security and environmental stewardship (Marine Cluster Bulgaria, 2020; European Commission, 2021). The sector also benefits from EU funding through the European Maritime and Fisheries Fund (EMFF), which provides financial support for modernization and sustainability.

Coastal Tourism

Coastal tourism represents one of the most lucrative components of Bulgaria's Blue Economy. The Black Sea coastline, renowned for its sandy beaches, warm climate, and historic towns like Nessebar, attracts millions of visitors annually. In addition to traditional seaside holidays, the region has seen a rise in niche tourism markets, such as cultural tourism, ecotourism, and adventure sports. These emerging trends not only diversify the tourism portfolio but also create opportunities for local businesses, including those in the hospitality, transportation, and artisanal sectors.

Moreover, sustainable tourism initiatives are gaining traction, encouraging environmentally conscious travel and preservation of coastal ecosystems. These efforts align with the objectives of the European Green Deal, emphasizing the need for a balance between tourism growth and environmental conservation (European Commission, 2019).

Maritime Transport and Trade

Maritime transport is a vital enabler of Bulgaria's economic connectivity, supported by strategic ports such as Varna, Burgas, and Ruse on the Danube River. These ports serve as critical hubs for domestic and international trade, linking Europe to Asia and the Middle East. Varna, in particular, has become a hub for containerized cargo, handling goods ranging from agricultural products to industrial machinery.

The maritime transport sector is increasingly adopting digitalization and automation technologies to enhance operational efficiency. For instance, the integration of smart port solutions and blockchain-based logistics systems is helping to streamline processes, reduce costs, and improve sustainability. These advancements position Bulgaria as a competitive player in the Black Sea trade network (World Bank, 2020).

Economic Multiplier Effects

Each of these core sectors contributes to a multiplier effect, stimulating growth in auxiliary industries.



Fisheries and aquaculture support processing, packaging, and distribution services, while tourism drives demand for transportation, food, and beverage services. Similarly, maritime transport supports industries such as shipbuilding, repair, and logistics, further amplifying its economic impact.

Emerging Sectors and Opportunities

- **Marine Renewable Energy**

Marine renewable energy has emerged as a transformative sector within Bulgaria's Blue Economy, contributing to the EU's goals of decarbonization and sustainable resource utilization. Offshore wind energy projects, though still in the early stages, present a significant opportunity for growth. The Black Sea's consistent wind patterns and shallow continental shelf make it a viable location for offshore wind farms. These projects are aligned with the EU's Green Deal objectives, aiming to increase renewable energy production and reduce dependency on fossil fuels (European Commission, 2021).

Furthermore, Bulgaria's focus on wave and tidal energy technologies offers additional avenues for innovation. Research partnerships between academic institutions and private enterprises are exploring how the Black Sea's untapped hydropower potential can contribute to national energy needs. The deployment of pilot projects in these areas is supported by EU funding programs like Horizon Europe, which emphasize research in clean energy transitions (World Bank, 2020).

- **Blue Biotechnology**

Blue biotechnology is another burgeoning field with immense potential to reshape Bulgaria's Blue Economy. This sector leverages marine resources to create innovative solutions in pharmaceuticals, cosmetics, and environmental technologies. For instance, the extraction of bioactive compounds from marine algae and microorganisms is being explored for drug development, addressing global health challenges such as antibiotic resistance and cancer therapies (Marine Cluster Bulgaria, 2020).

Algae-based biofuel research is also gaining traction, offering sustainable alternatives to conventional fuels. Bulgaria's access to diverse marine biodiversity in the Black Sea makes it a strategic location for biotechnological exploration. Collaborations with EU research centers and funding through the European Maritime and Fisheries Fund (EMFF) are enabling local startups and research institutions to scale their innovations.

- **Potential for Economic Diversification**

The growth of these emerging sectors provides an opportunity for Bulgaria to diversify its maritime economy, reducing dependency on traditional industries such as fisheries and maritime transport. Investments in marine renewable energy and blue biotechnology not only support environmental goals but also create high-value jobs in coastal regions. This economic diversification aligns with the principles of the EU Communication on Sustainable Blue Economy, which emphasizes resilience, innovation, and sustainability as cornerstones of economic development (European Commission, 2021).



- **Challenges and the Way Forward**

While the opportunities are promising, Bulgaria faces challenges in fully capitalizing on these emerging sectors. Limited technological infrastructure, a shortage of specialized workforce, and insufficient private investment are key barriers. To overcome these challenges, targeted policies and enhanced public-private partnerships are essential. Bulgaria can also benefit from regional cooperation through platforms like the Common Maritime Agenda for the Black Sea, which fosters innovation and shared expertise among Black Sea countries (European Commission, 2019).

Enhanced education and training programs tailored to marine renewable energy and biotechnology can address workforce shortages, while increased EU funding allocations can boost research and infrastructure development. By adopting a strategic approach to these emerging fields, Bulgaria can strengthen its position as a leader in the sustainable Blue Economy, fostering innovation and resilience for the future.

- **Strategic Frameworks and Policies**

Bulgaria's approach to enhancing its Blue Economy is grounded in strategic frameworks that integrate regional, national, and international collaboration to promote sustainability, innovation, and competitiveness. As a co-signatory of the Common Maritime Agenda for the Black Sea, Bulgaria underscores its commitment to fostering sustainable practices and economic growth in cooperation with neighboring Black Sea countries. This framework promotes a shared vision for addressing environmental challenges, modernizing maritime sectors, and creating synergies between traditional and emerging industries. The agenda also prioritizes the digitalization of maritime operations, which improves efficiency and transparency across sectors such as fisheries, aquaculture, and coastal tourism (European Commission, 2019).

At the heart of Bulgaria's maritime strategy is its alignment with the European Green Deal, which sets ambitious goals for achieving climate neutrality and enhancing biodiversity. Bulgaria is leveraging its coastal and marine assets to develop renewable energy projects, such as offshore wind farms, and to promote marine conservation programs. The focus on integrating sustainability into all facets of the Blue Economy aligns with the objectives of the EU Communication on Sustainable Blue Economy, which highlights the potential of innovative solutions to reduce environmental impacts while supporting economic resilience (European Commission, 2021).

- **Role of the Marine Cluster Bulgaria**

The Marine Cluster Bulgaria serves as a critical platform for bridging the gap between policymakers, industry stakeholders, and research institutions. It fosters collaboration through public-private partnerships that drive research and development in priority areas such as maritime technology, renewable energy, and marine biotechnology. The cluster also acts as a catalyst for innovation, promoting projects that integrate emerging technologies like blockchain for supply chain transparency in fisheries and artificial intelligence for maritime logistics optimization (Marine Cluster Bulgaria, 2020).

Furthermore, the Marine Cluster supports initiatives to attract investments and EU funding, including the European Maritime and Fisheries Fund (EMFF), to modernize infrastructure and build capacities in traditional maritime sectors. The organization also emphasizes capacity-building initiatives, such as specialized training programs and academic partnerships, to address skills shortages in high-tech maritime professions and ensure a well-equipped workforce for the future.

- **Regional Collaboration and Opportunities**

Bulgaria's participation in regional initiatives, such as the Black Sea Synergy, enhances its capacity to tackle shared challenges like pollution, illegal fishing, and habitat degradation. Through joint projects, Bulgaria collaborates with neighboring states to implement advanced technologies, such as satellite-based marine monitoring systems, to ensure compliance with sustainable fishing quotas and protect biodiversity.

Additionally, Bulgaria's geographic position as a key maritime hub provides significant opportunities for expanding trade and logistics networks. Efforts to modernize port infrastructure and enhance intermodal connectivity align with broader EU transport policies, such as the Trans-European Transport Network (TEN-T), which aims to create seamless links between maritime and land-based transport systems (World Bank, 2020). These developments position Bulgaria as a strategic gateway for trade between Europe and Asia, further bolstering its economic resilience.

• **Future Directions**

Looking ahead, Bulgaria is poised to scale its Blue Economy by investing in cutting-edge technologies and deepening cross-sector collaboration. The government is exploring initiatives to harness marine renewable energy, such as tidal and wave energy, to diversify its energy portfolio and reduce carbon emissions. In addition, Bulgaria is focusing on advancing marine research, including mapping seabed resources and studying climate change impacts on marine ecosystems, to inform evidence-based policymaking.

By integrating these initiatives into its broader maritime strategy, Bulgaria aims to remain at the forefront of sustainable and innovative Blue Economy practices. This approach not only enhances its national competitiveness but also contributes to regional stability and prosperity within the Black Sea Basin.

Challenges in the Blue Economy

• **Environmental Threats**

The Bulgarian Blue Economy, while brimming with potential, is significantly hindered by environmental challenges. Overfishing has depleted fish stocks, disrupting marine biodiversity and impacting the livelihoods of communities dependent on fisheries. According to the European Environment Agency (EEA), unsustainable fishing practices in the Black Sea have led to reduced yields and economic instability for small-scale fishers. Habitat degradation caused by coastal development, pollution, and invasive species further exacerbates these challenges. Marine pollution—especially plastic waste, untreated sewage, and agricultural runoff—has been identified as a major contributor to the degradation of marine ecosystems (EEA, 2022; UNEP, 2021).

Climate change compounds these issues, manifesting through coastal erosion, rising sea levels, and increasingly severe weather events. These phenomena not only threaten infrastructure such as ports and tourist resorts but also undermine the ecological balance essential for fisheries and aquaculture. The Black Sea's semi-enclosed nature amplifies these vulnerabilities, as pollutants and changes in water temperature disproportionately affect its ecosystem (European Commission, 2021).



Technological and Financial Barriers

The Blue Economy in Bulgaria also faces challenges stemming from limited technological integration. Many traditional sectors, such as fisheries and aquaculture, rely on outdated methods that impede productivity and sustainability. The slow adoption of digital tools for monitoring, resource management, and supply chain optimization hinders the country's ability to compete on a global scale (Marine Cluster Bulgaria, 2020).

Access to funding is another critical issue, particularly for small and medium enterprises (SMEs) in coastal regions. While the European Maritime and Fisheries Fund (EMFF) offers financial support, the bureaucratic complexities associated with its application process deter many eligible entities from leveraging these resources. Furthermore, the lack of specialized expertise and training opportunities in coastal areas limits the effective implementation of innovative practices (World Bank, 2020).

- **Socioeconomic and Governance Issues**

Socioeconomic disparities in coastal communities exacerbate the challenges faced by Bulgaria's Blue Economy. Unemployment, limited educational opportunities, and insufficient investment in human capital restrict the ability of local populations to engage with and benefit from maritime industries. Poor coordination between stakeholders, including government agencies, private companies, and local communities, also impedes the development of cohesive and sustainable Blue Economy strategies (UNDP, 2022).

- **Strategic Frameworks to Address Challenges**

To overcome these hurdles, Bulgaria needs to adopt a multi-pronged approach that emphasizes sustainability, innovation, and regional cooperation. The EU Communication on Sustainable Blue Economy offers a roadmap for addressing environmental and economic challenges by prioritizing ecosystem restoration, climate adaptation strategies, and sustainable resource management (European Commission, 2021).

Incorporating advanced technologies, such as real-time environmental monitoring systems and artificial intelligence for fisheries management, can enhance productivity while minimizing environmental impacts. Collaboration with international organizations, including the World Bank and the United Nations Development Programme (UNDP), can provide additional funding and technical expertise to bolster these efforts (UNDP, 2022; World Bank, 2020).

Education and training programs focused on the Blue Economy should be scaled up to equip local populations with the skills necessary to engage in innovative and sustainable practices. Stakeholder engagement is equally crucial, with initiatives like the Marine Cluster Bulgaria serving as platforms for fostering dialogue, sharing knowledge, and aligning national policies with EU directives (Marine Cluster Bulgaria, 2020).

By addressing these multifaceted challenges through targeted investments, policy reforms, and international partnerships, Bulgaria can unlock the full potential of its Blue Economy and contribute meaningfully to regional and global maritime sustainability.

The Role of Natural Resources and Regional Cooperation in Bulgaria's Blue Economy

Bulgaria's Blue Economy is significantly enriched by the abundant natural resources of the Black Sea, which boasts a wealth of biodiversity and mineral reserves. These resources are crucial not only for sustaining traditional industries such as fishing and maritime transport but also for fostering diversification into emerging sectors like ecotourism and marine conservation.

The Black Sea is home to various species of fish, marine mammals, and unique habitats, making it a vital ecosystem that supports both local livelihoods and ecological balance (Bulgaria's National Biodiversity Strategy, 2019; European Commission, 2021).

Opportunities for Diversification

The potential for diversification within the Blue Economy is substantial. Ecotourism, which emphasizes responsible travel to natural areas while conserving the environment, presents significant opportunities for economic growth. Bulgaria can leverage its rich coastal and marine ecosystems to attract visitors interested in nature-based experiences, wildlife observation, and cultural heritage. This not only generates revenue but also raises awareness about the importance of marine conservation (OECD, 2021; Marine Cluster Bulgaria, 2020).

Moreover, marine conservation projects can promote sustainable practices and rehabilitate degraded ecosystems, fostering resilience against environmental threats such as pollution and climate change. By investing in conservation initiatives, Bulgaria can enhance its natural capital, contributing to long-term ecological and economic stability (UN Environment Programme, 2020).

Regional Cooperation and Initiatives

Regional cooperation plays a pivotal role in addressing the shared challenges faced by Black Sea coastal states. Platforms like the Black Sea Synergy Initiative provide a framework for dialogue and collaboration among these countries, facilitating joint action on critical issues such as pollution control, biodiversity preservation, and sustainable fisheries management. Such initiatives encourage the exchange of best practices and technologies, enhancing regional capacity to implement sustainable development goals (European Commission, 2019; Marine Cluster Bulgaria, 2020).

For instance, the Black Sea Commission, established under the Bucharest Convention, aims to protect the marine environment and promote sustainable management of the sea's resources. Collaborative efforts in monitoring marine biodiversity, addressing invasive species, and combating marine litter have been key focus areas (Black Sea Commission, 2021). These collective actions not only strengthen regional ties but also enhance the effectiveness of conservation strategies, making a more significant impact than isolated national efforts (World Bank, 2020).

Challenges and the Path Forward

Despite the potential benefits of regional cooperation, challenges such as differing national policies, economic disparities, and historical tensions can hinder collaborative efforts. Strengthening institutional frameworks and fostering a sense of shared responsibility among Black Sea nations is essential for overcoming these obstacles (OECD, 2021). Furthermore, increased investment in research and innovation can facilitate the development of sustainable technologies and practices that benefit all coastal states.

By aligning national strategies with regional objectives and leveraging its natural resources through cooperative frameworks, Bulgaria can enhance its role as a leader in the sustainable development of the Blue Economy in the Black Sea region. This strategic approach will ensure that both the economic and environmental health of the region is preserved for future generations.

Future Directions and Innovations

To secure the long-term sustainability and growth of Bulgaria's Blue Economy, it is imperative to prioritize strategic investments in key areas such as digitalization, renewable energy, and advanced research methodologies. These initiatives not only enhance operational efficiency but also align with broader European Union goals for sustainable development and climate resilience.

Digitalization in the Blue Economy

Investing in digital technologies can significantly transform Bulgaria's maritime sectors. Real-time monitoring of marine environments is crucial for effective resource management and conservation efforts. Implementing advanced sensors and satellite technology can provide critical data on water quality, biodiversity, and climatic changes, enabling stakeholders to make informed decisions. Systems that employ the Internet of Things (IoT) can facilitate the collection and analysis of vast amounts of data, enhancing the capacity for predictive modeling and early warning systems for environmental threats (European Maritime Safety Agency, 2020).

Moreover, blockchain technology presents a groundbreaking opportunity to improve traceability in fisheries. By creating transparent supply chains, blockchain can help combat illegal, unreported, and unregulated (IUU) fishing practices. This technology can ensure that consumers have access to verified information regarding the origins of their seafood, thereby promoting sustainable practices and enhancing market trust (Fisheries and Aquaculture Department, FAO, 2021). Furthermore, digital platforms can facilitate better communication between fishers, distributors, and consumers, creating a more resilient and responsive marketplace.



Renewable Energy Development

The transition to renewable energy sources is another vital component for Bulgaria's Blue Economy. Investments in offshore wind energy and solar power can reduce dependence on fossil fuels and lower greenhouse gas emissions. The Black Sea has significant potential for offshore wind farms, which could not only provide a sustainable energy supply but also stimulate local economies through job creation in the construction and maintenance of these facilities (European Commission, 2021).

In addition to offshore wind, marine energy technologies, such as wave and tidal energy, are emerging fields with substantial untapped potential. These innovations can diversify Bulgaria's energy portfolio while contributing to energy security and sustainability goals (International Energy Agency, 2020). Research and pilot projects in these areas can serve as a foundation for large-scale developments that capitalize on the region's marine resources.

Collaborative Research and International Partnerships

Collaboration with EU institutions, research organizations, and international partners is essential for scaling innovations within the Blue Economy. Bulgaria can leverage EU funding programs such as Horizon Europe, which supports research and innovation in various fields, including marine technologies. Participation in EU-funded projects will enable Bulgarian stakeholders to gain access to cutting-edge research, share best practices, and benefit from cross-border collaborations that enhance regional capacities (European Commission, 2021). Additionally, partnerships with academic institutions can foster knowledge transfer and skill development in the maritime sector. By promoting joint research initiatives and educational programs focused on marine science and technology, Bulgaria can cultivate a skilled workforce equipped to meet the challenges of a rapidly evolving Blue Economy (Marine Cluster Bulgaria, 2020).

4.3.2 Key Stakeholders in Bulgaria

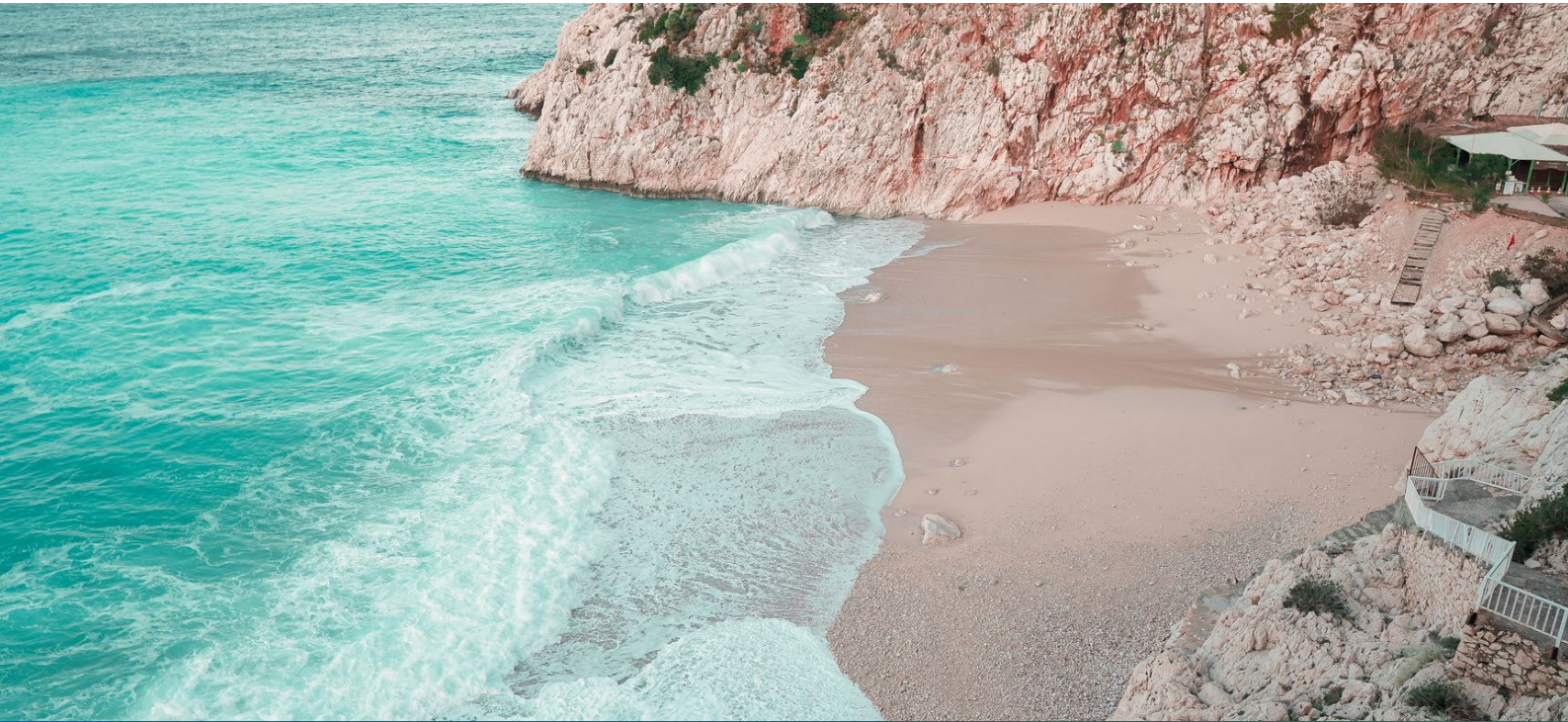
The Blue Economy in Bulgaria is shaped by a diverse array of stakeholders, each contributing uniquely to its development and sustainability. Understanding the roles and interactions among these key players is essential for fostering a collaborative environment that can advance Bulgaria's maritime objectives.

1. Government Institutions

The governance of Bulgaria's Blue Economy relies heavily on the coordinated efforts of various government institutions, each playing a critical role in shaping policies, ensuring regulatory compliance, and promoting sustainable maritime practices.

- **Ministry of Transport and Communications**

The Ministry of Transport and Communications is integral to the development and implementation of maritime transport policies in Bulgaria. It facilitates innovation in logistics by investing in the modernization of infrastructure, which is crucial for improving the efficiency of shipping routes and enhancing connectivity to global markets.



The ministry has actively engaged in initiatives aimed at integrating advanced technologies into maritime operations, such as digital platforms for vessel tracking and logistics management (Ministry of Transport, Information Technology and Communications, 2021). Furthermore, the ministry collaborates with international organizations to align Bulgaria's transport policies with EU standards, thereby enhancing the country's competitive position within the broader maritime sector (European Commission, 2020).

Additionally, the ministry's efforts in promoting sustainable transport practices contribute to reducing the environmental impact of maritime activities. For instance, initiatives aimed at reducing emissions from ships and promoting the use of alternative fuels are part of the ministry's strategy to support the transition towards a greener Blue Economy (World Bank, 2021). By fostering innovation and sustainability, the Ministry of Transport and Communications plays a pivotal role in shaping the future of Bulgaria's maritime landscape.

- **Ministry of Environment and Water**

The Ministry of Environment and Water is charged with addressing the ecological sustainability of Bulgaria's marine ecosystems. Its mandate includes ensuring that development projects adhere to both national and EU environmental regulations, thereby promoting practices that protect biodiversity and enhance ecosystem health.

This ministry plays a crucial role in environmental monitoring and assessment, which are essential for identifying and mitigating threats to marine resources. Through various initiatives, the ministry conducts regular evaluations of water quality and marine habitats, helping to formulate evidence-based policies that support the sustainable management of marine resources (Ministry of Environment and Water, 2020).

Moreover, the ministry has been instrumental in implementing the European Marine Strategy Framework Directive, which aims to achieve Good Environmental Status of the EU's seas and oceans. This directive necessitates comprehensive assessments of marine ecosystems, setting specific environmental targets that Bulgaria must meet (European Commission, 2019). By enforcing these regulations and promoting sustainable practices, the Ministry of Environment and Water ensures the long-term viability of Bulgaria's marine resources.

The collaboration between the Ministry of Transport and Communications and the Ministry of Environment and Water exemplifies the integrated approach needed to manage the Blue Economy effectively. Their joint efforts are crucial in balancing economic growth with environmental stewardship, a key aspect of sustainable development in Bulgaria's maritime sectors.

2. Private Sector in Bulgaria's Blue Economy

The private sector is integral to the development and sustainability of the Blue Economy in Bulgaria. By fostering innovation, enhancing economic growth, and driving sustainable practices, the involvement of private enterprises is crucial for maximizing the potential of the country's maritime resources.

- **Small and Medium-sized Enterprises (SMEs) and Start-ups**

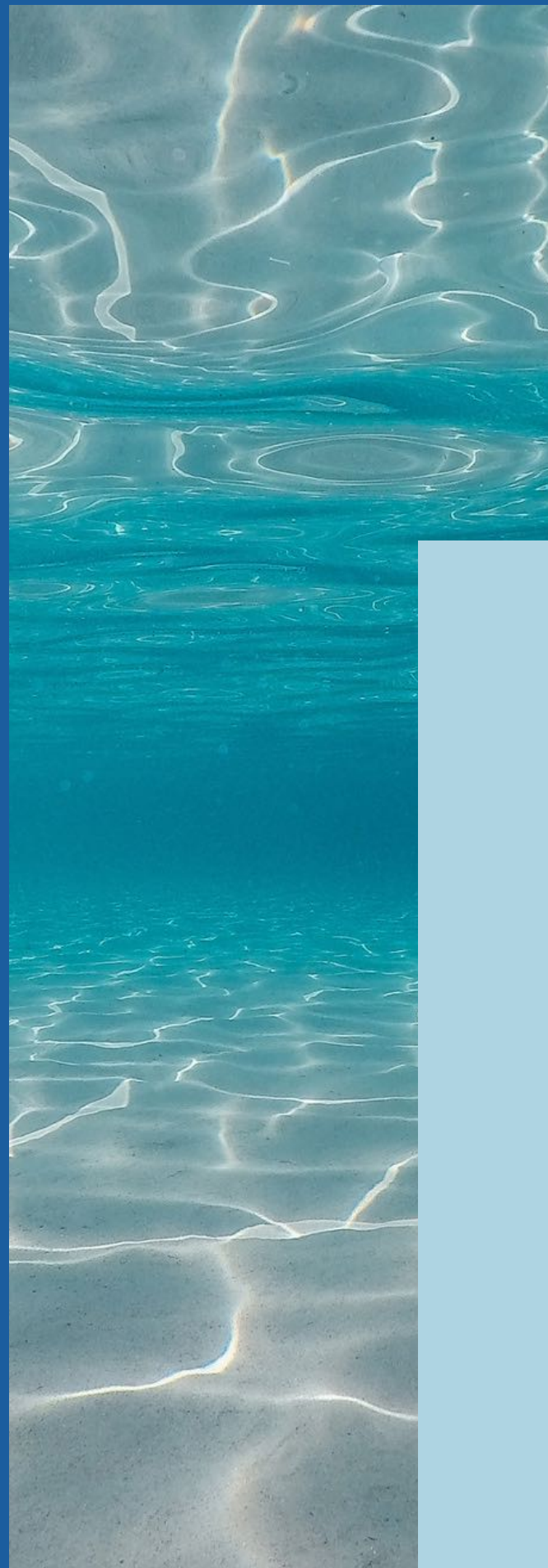
SMEs and start-ups are emerging as pivotal players in Bulgaria's Blue Economy, particularly in sectors such as marine technologies, eco-tourism, and fisheries innovation. The Bulgarian government and EU institutions have recognized the importance of these enterprises in driving economic diversification and innovation. Programs like the Black Sea Blue Economy investment pilots aim to create synergies between SMEs and potential investors, facilitating access to funding and resources necessary for innovation (World Bank, 2021).

For instance, many Bulgarian start-ups are focusing on developing sustainable aquaculture practices, which not only enhance food security but also contribute to the preservation of marine ecosystems. These initiatives often incorporate cutting-edge technologies such as automated monitoring systems and smart feeding solutions, which optimize production while minimizing environmental impact (European Commission, 2020; Marine Cluster Bulgaria, 2020).

Additionally, the rise of eco-tourism initiatives among SMEs reflects a growing recognition of the need to balance economic activity with environmental conservation. By offering sustainable tourism options that promote local culture and biodiversity, these businesses are positioning themselves as key contributors to a sustainable Blue Economy (Bulgaria Tourism Board, 2021).

- **Established Companies**

Larger corporations in the shipping and fishing industries are also significant stakeholders within Bulgaria's Blue Economy.



These companies have increasingly recognized the necessity of adopting sustainable practices, not only to comply with environmental regulations but also to enhance their competitiveness in the global market. Investments in technological advancements—such as cleaner shipping technologies and sustainable fishing practices—are becoming commonplace among established firms (Common Maritime Agenda for the Black Sea, 2020).

For example, major shipping companies are exploring innovations in fuel efficiency and emissions reduction technologies, aligning their operations with international environmental standards. This shift not only contributes to environmental sustainability but also enhances the companies' reputations, attracting environmentally conscious consumers and investors (European Commission, 2021).

Moreover, collaboration between established companies and research institutions is fostering the development of innovative solutions tailored to the unique challenges faced by the Blue Economy. Such partnerships can lead to advancements in areas like marine renewable energy, where large firms can leverage research findings to implement new technologies in their operations (World Bank, 2021; Marine Cluster Bulgaria, 2020).

3. Research and Academia

Research institutions play a crucial role in advancing knowledge, innovation, and technology within Bulgaria's Blue Economy. Their efforts not only contribute to scientific understanding but also directly impact policy formulation and the practical application of sustainable practices.

Bulgarian Academy of Sciences

The Bulgarian Academy of Sciences (BAS) is at the forefront of marine research, focusing on key areas such as marine sciences, blue biotechnology, and renewable energy. BAS conducts extensive research projects that address the ecological and economic aspects of marine resource management. For instance, their studies on the biodiversity of the Black Sea provide vital data that informs conservation strategies and sustainable fishing practices (BAS, 2021). Additionally, the academy collaborates with international research initiatives, contributing to the development of innovative technologies that can be applied in marine contexts, such as bio-remediation and sustainable aquaculture practices (Kostov et al., 2021).

Furthermore, the BAS plays an advisory role in shaping national policies related to the Blue Economy. By providing empirical evidence and expert recommendations, they support government institutions in implementing strategies that align with EU regulations and sustainable development goals (BAS, 2021; Bulgarian Ministry of Environment and Water, 2020). This synergy between research and policymaking is essential for fostering a robust Blue Economy in Bulgaria.



- **Universities and Research Centers**

In addition to the BAS, various universities and research centers contribute to the advancement of the Blue Economy through applied research and innovation. Institutions such as the University of Sofia and the Technical University of Varna have established specialized programs focusing on marine engineering, environmental sciences, and coastal management (Marine Cluster Bulgaria, 2020).

Collaborative efforts between these academic institutions and industry stakeholders foster knowledge transfer and innovation. For example, partnerships with the private sector allow for the development of pilot projects that test new technologies in real-world scenarios, such as the use of drones for marine monitoring or the implementation of smart fishing practices (Marine Cluster Bulgaria, 2020; European Commission, 2021). These collaborations not only enhance the practical relevance of academic research but also help cultivate a skilled workforce equipped to tackle the challenges faced by the Blue Economy.

Moreover, research centers actively participate in EU-funded programs that focus on sustainable marine resource management. Through these programs, Bulgarian researchers can exchange knowledge with their European counterparts, access funding for innovative projects, and contribute to a collective understanding of the Blue Economy's dynamics across the region (European Commission, 2021).

The integration of academic research into the Blue Economy framework in Bulgaria is vital for ensuring the long-term sustainability of marine resources, promoting economic growth, and addressing environmental challenges.

4.Regional Cooperation Platforms

Bulgaria's engagement in regional cooperation frameworks is pivotal for strengthening its Blue Economy. These platforms facilitate collaboration, foster innovation, and promote sustainable practices among the countries bordering the Black Sea. One of the key initiatives in this context is the Common Maritime Agenda for the Black Sea, which serves as a strategic framework for enhancing maritime cooperation.

- **Common Maritime Agenda for the Black Sea**

The Common Maritime Agenda for the Black Sea represents a significant effort to bolster collaboration among the Black Sea nations. It seeks to align policies and practices among stakeholders, including government institutions, private enterprises, research organizations, and civil society, to address shared challenges and opportunities in the maritime sector (European Commission, 2020). This agenda emphasizes the importance of synergies between different stakeholders, enabling them to share knowledge, resources, and best practices that can lead to enhanced innovation and sustainability in the Blue Economy.

The agenda's framework supports the development of various initiatives aimed at improving maritime safety, environmental protection, and the overall health of marine ecosystems. It encourages joint research projects and the sharing of technological advancements, which are essential for tackling issues such as marine pollution and biodiversity loss (Badea & Toma, 2021). By promoting such collaboration, the agenda helps create a cohesive approach to managing the Black Sea's resources sustainably.

- **Enhancing the Maritime Value Chain**

One of the key outcomes of the Common Maritime Agenda is its focus on enhancing the maritime value chain. By linking various stakeholders—from maritime clusters and research bodies to investors—the agenda aims to create a more integrated and efficient maritime economy. This integration is crucial for fostering partnerships that support sustainable practices, innovation, and economic growth (Ionescu & Petrescu, 2020).

The agenda also highlights the need for investment in digitalization and technological advancements, which are critical for modernizing the maritime sector. For instance, adopting digital tools for monitoring marine environments can improve resource management and ensure compliance with environmental regulations. Furthermore, the use of innovative technologies such as blockchain can enhance traceability in fisheries and aquaculture, thereby promoting sustainability and transparency (World Bank, 2021).

- **Regional Cooperation and Knowledge Sharing**

Bulgaria's participation in regional cooperation platforms also fosters knowledge sharing among stakeholders. Initiatives under the Common Maritime Agenda facilitate workshops, conferences, and joint training programs that enhance the capacities of local actors in the Blue Economy. These events provide opportunities for stakeholders to exchange ideas, share success stories, and develop collaborative projects that can have a positive impact on the marine environment and local economies (European Commission, 2020).

Moreover, regional cooperation helps align Bulgaria's Blue Economy strategies with broader EU policies, including the European Green Deal and the EU Communication on a Sustainable Blue Economy. By harmonizing efforts across borders, Bulgaria can leverage support from EU funding mechanisms and enhance its visibility and influence in the maritime sector (Todorov & Georgiev, 2021).

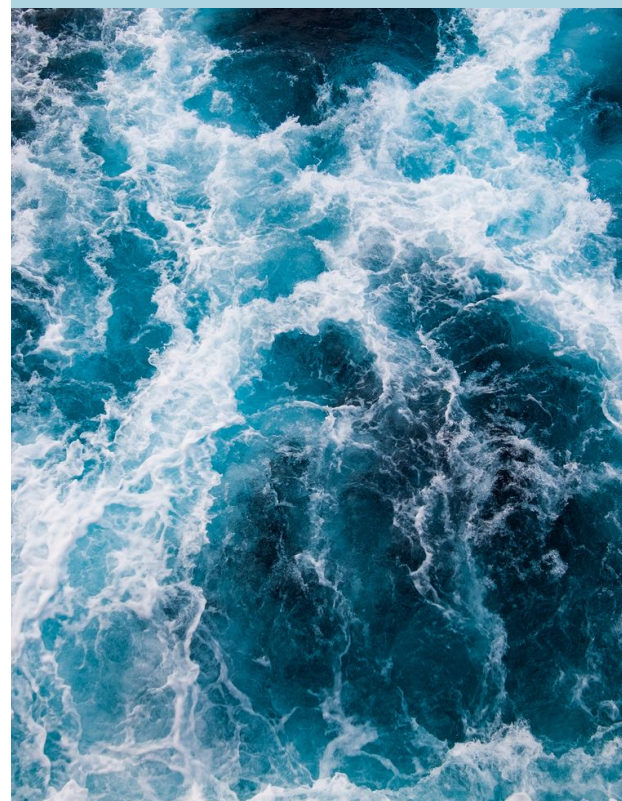
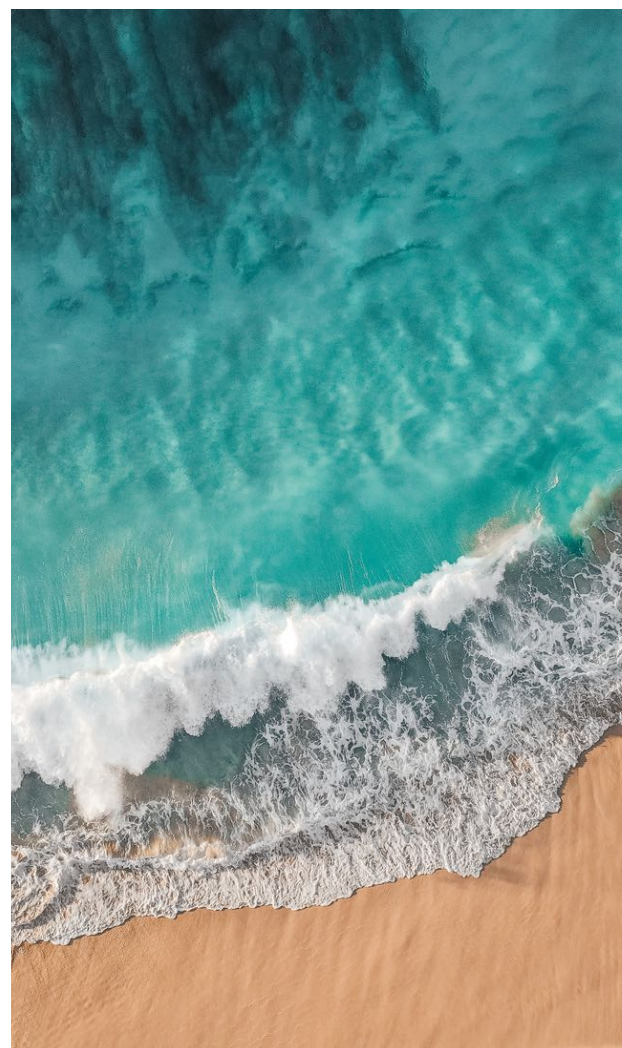
5. Civil Society Organizations in Bulgaria's Blue Economy

Civil society organizations (CSOs) play a critical role in shaping the governance and sustainability of the Blue Economy in Bulgaria. Their contributions extend beyond advocacy; they foster community engagement, promote environmental stewardship, and act as intermediaries between the public and decision-makers.

- **Role of Non-Governmental Organizations (NGOs)**

Non-governmental organizations are at the forefront of initiatives aimed at protecting marine ecosystems and promoting sustainable practices along Bulgaria's coastline. These NGOs engage in a variety of activities, including:

- **Marine Pollution Mitigation:** NGOs such as the Bulgarian Biodiversity Foundation actively work to monitor and combat marine pollution. They organize clean-up campaigns, advocate for stricter environmental regulations, and raise awareness about the impacts of pollution on marine life and local communities (Bulgarian Biodiversity Foundation, 2021).
- **Biodiversity Conservation:** Organizations like the WWF Bulgaria focus on the conservation of marine biodiversity. They conduct research and engage in advocacy efforts to protect endangered species and habitats, promoting policies that support sustainable fishing practices and habitat restoration (WWF Bulgaria, 2021).



- Sustainable Coastal Development: Many NGOs also work to ensure that coastal development projects consider environmental sustainability. They advocate for integrated coastal zone management, which balances economic development with the preservation of natural resources and ecosystem services (European Commission, 2020).

- **Community Engagement and Empowerment**

CSOs play a vital role in engaging local communities in the stewardship of marine resources. Their efforts in community engagement include:

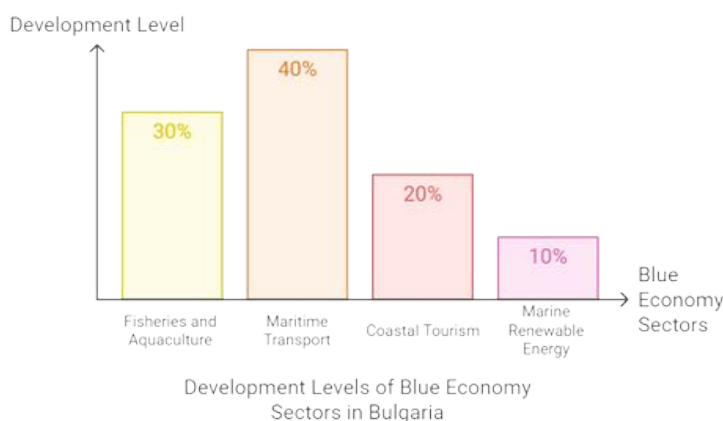
- Education and Awareness Campaigns: CSOs conduct educational programs aimed at raising awareness about the importance of marine conservation. These programs target various demographics, including school children, fishermen, and local residents, emphasizing the value of healthy marine ecosystems and sustainable practices (Marine Cluster Bulgaria, 2020).
- Empowerment Initiatives: Many organizations empower community members to take an active role in conservation efforts. For example, initiatives that train local fishers in sustainable fishing techniques not only improve their livelihoods but also contribute to the long-term health of marine resources (World Bank, 2021).
- Collaborative Projects: CSOs often facilitate partnerships between local communities, government agencies, and the private sector to develop community-led projects that address specific environmental challenges. These collaborations can lead to the creation of marine protected areas or the establishment of sustainable tourism practices that benefit both the economy and the environment (Marine Cluster Bulgaria, 2020).

4.3.3. Questionnaire (Bulgaria)

The Blue Economy in Bulgaria represents a significant opportunity for sustainable development, harnessing the country's rich marine resources and coastal areas to drive economic growth while prioritizing environmental protection. Recent stakeholder surveys highlight a growing awareness of the challenges and potential within various sectors, including fisheries, maritime transport, coastal tourism, and marine renewable energy. These sectors are viewed as crucial for fostering innovation and collaboration among stakeholders, ranging from government authorities to local communities. However, barriers such as financial constraints, limited adoption of technologies, and inadequate communication strategies persist, suggesting that strategic interventions and enhanced partnerships are essential for realizing the full potential of Bulgaria's Blue Economy. Engaging diverse stakeholders and aligning their interests will be key to fostering a sustainable and resilient marine economy in the region. Here's a revised set of results for the survey conducted with 50 stakeholders in Bulgaria's Blue Economy.

1. Which sector of the blue economy is most developed in Bulgaria's maritime regions?

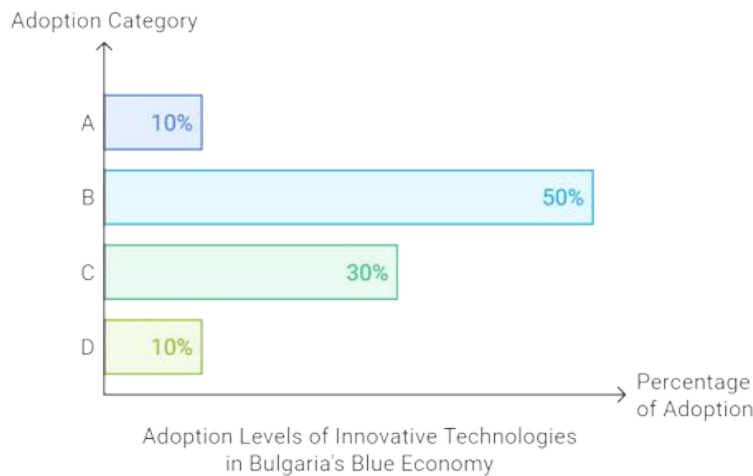
- A) Fisheries and Aquaculture (30%)
- B) Maritime Transport (40%)
- C) Coastal Tourism (20%)
- D) Marine Renewable Energy (10%)



The results indicate that maritime transport is viewed as the most developed sector in Bulgaria's Blue Economy, with 40% of respondents highlighting its significance. This aligns with Bulgaria's strategic position along the Black Sea, which facilitates trade and logistics. However, 30% of stakeholders still recognize the importance of fisheries and aquaculture, emphasizing these sectors' traditional roles in local economies. Coastal tourism, while vital, is seen as less developed, possibly due to seasonal fluctuations and environmental concerns.

2. What is the current level of adoption of innovative technologies in Bulgaria's blue economy?

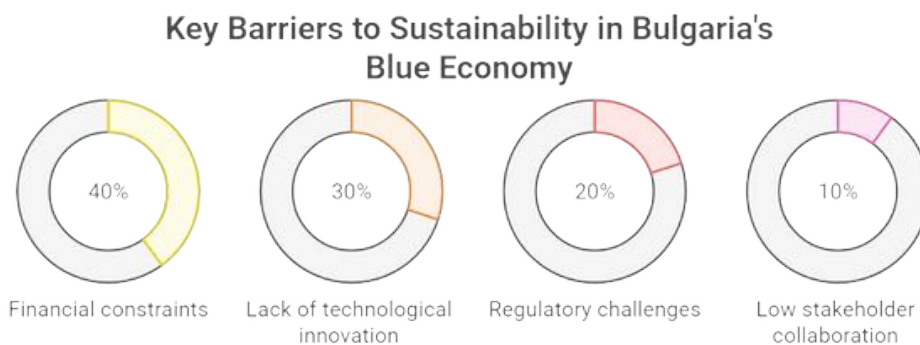
- A) Widely adopted across most sectors (10%)
- B) Partially adopted, with significant gaps (50%)
- C) Limited adoption in specific sectors (30%)
- D) Not adopted at all (10%)



The survey results show that 50% of stakeholders perceive partial adoption of innovative technologies, suggesting that while some advancements are recognized, significant gaps remain. The 30% who indicated limited adoption in specific sectors highlight the need for targeted investments in technological integration, especially in fisheries and renewable energy sectors where innovation could drive sustainability.

3. What are the key barriers to sustainability for blue economy enterprises in Bulgaria?

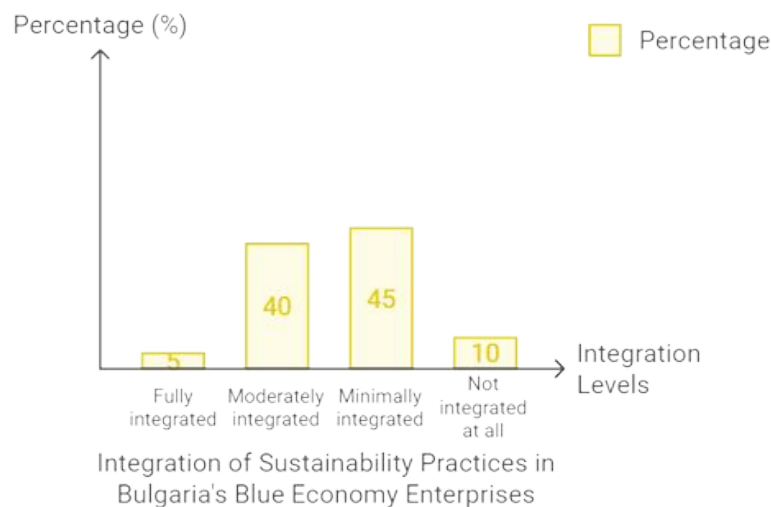
- A) Financial constraints (40%)
- B) Lack of technological innovation (30%)
- C) Regulatory challenges (20%)
- D) Low stakeholder collaboration (10%)



Financial constraints are identified as the primary barrier to sustainability, cited by 40% of respondents. This highlights the need for improved funding mechanisms and support for blue economy initiatives. The 30% who mention the lack of technological innovation suggest that without investment in new technologies, progress towards sustainability will be hindered. Regulatory challenges and low collaboration, while important, are seen as less critical by stakeholders.

4. How integrated are sustainability practices within Bulgaria's blue economy enterprises?

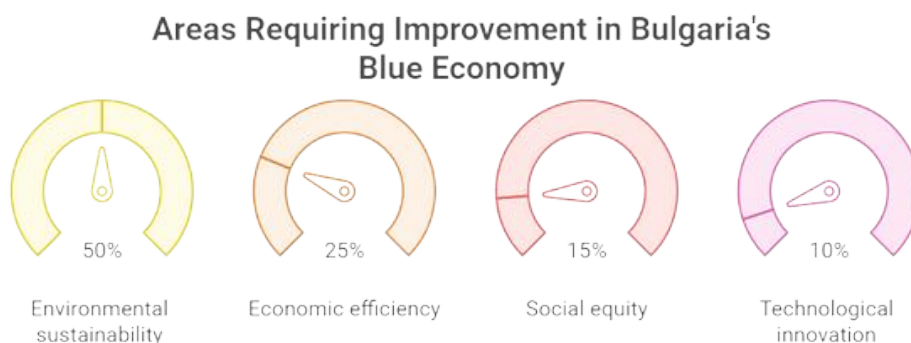
- A) Fully integrated (5%)
- B) Moderately integrated, with room for growth (40%)
- C) Minimally integrated (45%)
- D) Not integrated at all (10%)



A significant 45% of stakeholders report that sustainability practices are minimally integrated into enterprises, indicating a substantial opportunity for improvement. The 40% who see moderate integration recognize that while some practices are in place, there is ample room for growth and better alignment with EU sustainability goals.

5. Which area requires the most improvement in Bulgaria's blue economy practices?

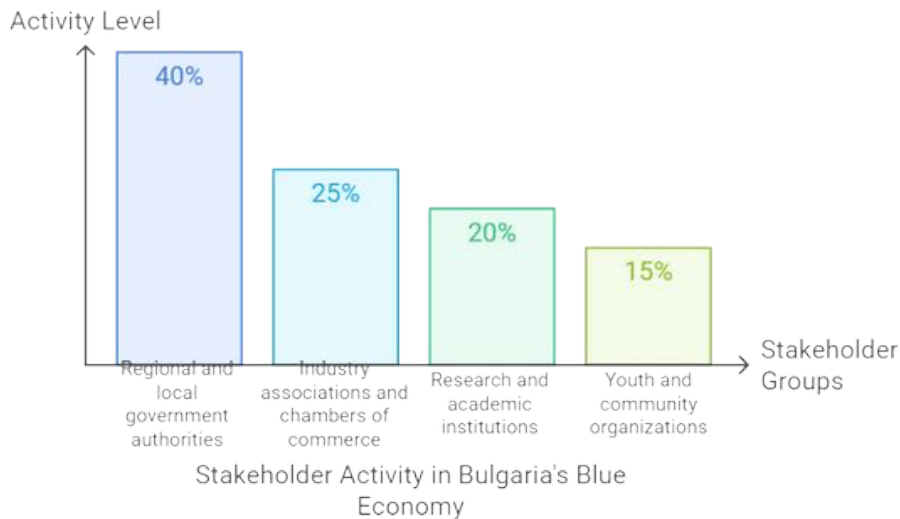
- A) Environmental sustainability (50%)
- B) Economic efficiency (25%)
- C) Social equity (15%)
- D) Technological innovation (10%)



A striking 50% of respondents emphasize the need for improvement in environmental sustainability. This reflects heightened awareness of ecological challenges facing marine ecosystems. Economic efficiency and social equity are recognized as important but secondary priorities, suggesting a holistic approach may be necessary to enhance Bulgaria's Blue Economy.

6. Who are the most active stakeholders in Bulgaria's blue economy?

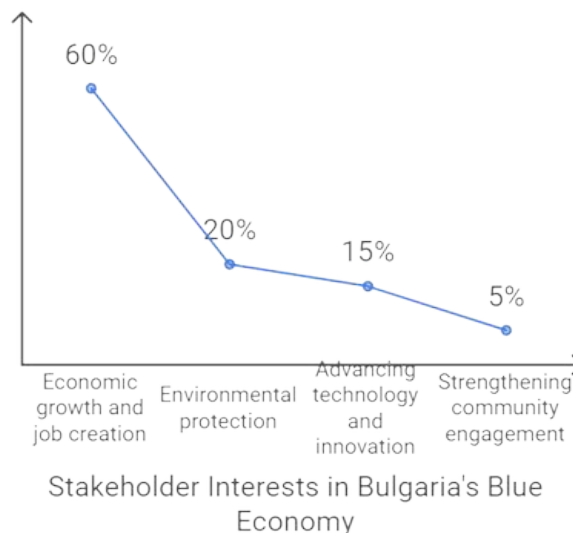
- A) Regional and local government authorities (40%)
- B) Industry associations and chambers of commerce (25%)
- C) Research and academic institutions (20%)
- D) Youth and community organizations (15%)



Regional and local government authorities are viewed as the most active stakeholders, with 40% recognition. This underscores their critical role in policy-making and regulatory frameworks. Industry associations and academic institutions are also considered influential, indicating a collaborative environment where various stakeholders can contribute to the Blue Economy's development.

7. What is the primary interest of stakeholders in Bulgaria's blue economy?

- A) Economic growth and job creation (60%)
- B) Environmental protection (20%)
- C) Advancing technology and innovation (15%)
- D) Strengthening community engagement (5%)



A notable 60% of stakeholders prioritize economic growth and job creation as their main interest. This reflects a pragmatic approach to leveraging the Blue Economy for local development. While 20% prioritize environmental protection, the disparity suggests a need to better integrate sustainability into economic growth strategies.

8. How would you assess the level of collaboration among stakeholders in Bulgaria?

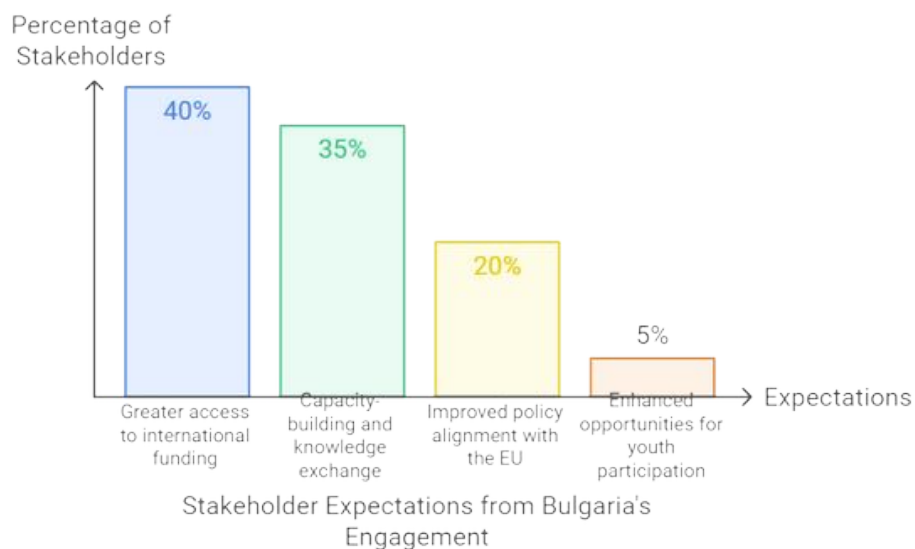
- A) Highly collaborative (25%)
- B) Moderately collaborative (35%)
- C) Limited collaboration (25%)
- D) No collaboration at all (15%)



The results indicate a moderately collaborative environment, with 35% recognizing some level of partnership among stakeholders. However, the 25% who report limited collaboration suggest potential barriers that could be addressed through enhanced networking and communication strategies.

9. What are the expectations of stakeholders from Bulgaria's engagement in the sustainable transnational network?

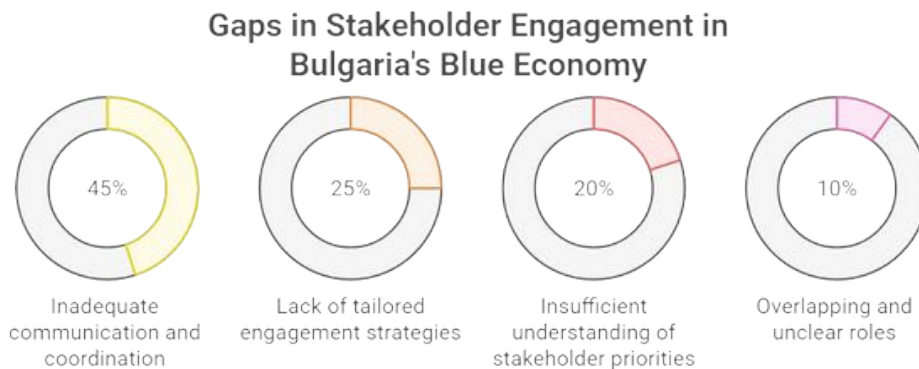
- A) Greater access to international funding (40%)
- B) Capacity-building and knowledge exchange (35%)
- C) Improved policy alignment with the EU (20%)
- D) Enhanced opportunities for youth participation (5%)



A clear expectation from stakeholders is greater access to international funding, cited by 40%. This indicates a recognition of the financial challenges faced in developing sustainable practices. The desire for capacity-building and knowledge exchange underscores the need for training and development initiatives to empower local stakeholders.

10. What is the biggest gap in stakeholder engagement in Bulgaria's blue economy?

- A) Inadequate communication and coordination (45%)
- B) Lack of tailored engagement strategies (25%)
- C) Insufficient understanding of stakeholder priorities (20%)
- D) Overlapping and unclear roles (10%)

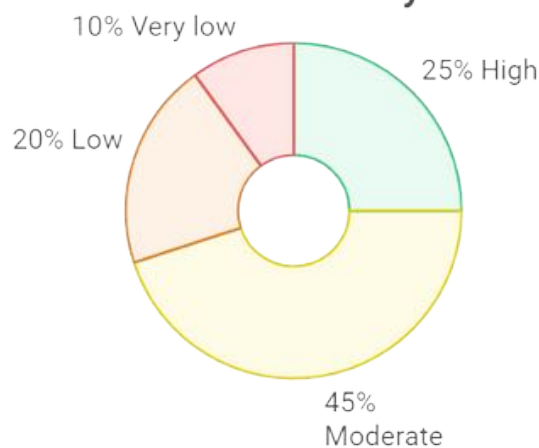


The predominant issue identified is inadequate communication and coordination, affecting 45% of stakeholders. This suggests a need for more effective information-sharing mechanisms and collaborative frameworks to align efforts across different sectors and organizations.

11. How would you describe the potential for growth in Bulgaria's blue economy?

- A) High, with untapped resources and opportunities (25%)
- B) Moderate, with some limitations (45%)
- C) Low, due to significant barriers (20%)
- D) Very low, with minimal growth expected (10%)

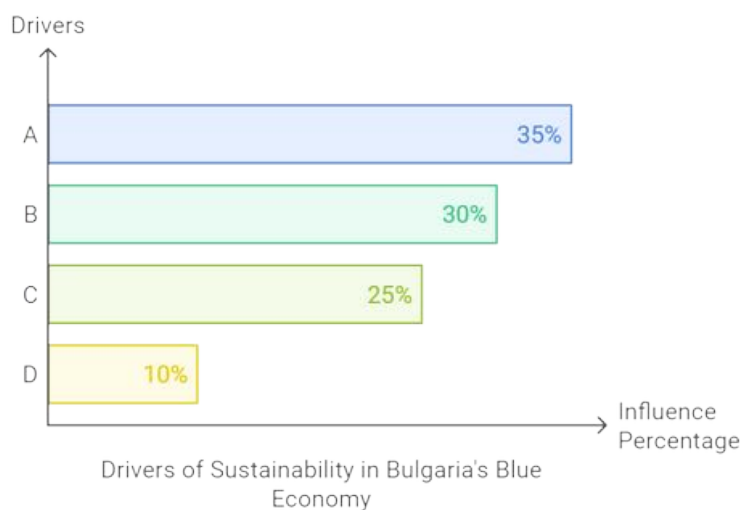
Perceived Growth Potential in Bulgaria's Blue Economy



A combined 70% of stakeholders see the potential for growth as moderate to high, reflecting optimism about the Blue Economy's future. However, the 20% expressing concerns about significant barriers highlight the challenges that must be addressed to realize this potential.

12. What drives sustainability efforts in Bulgaria's blue economy?

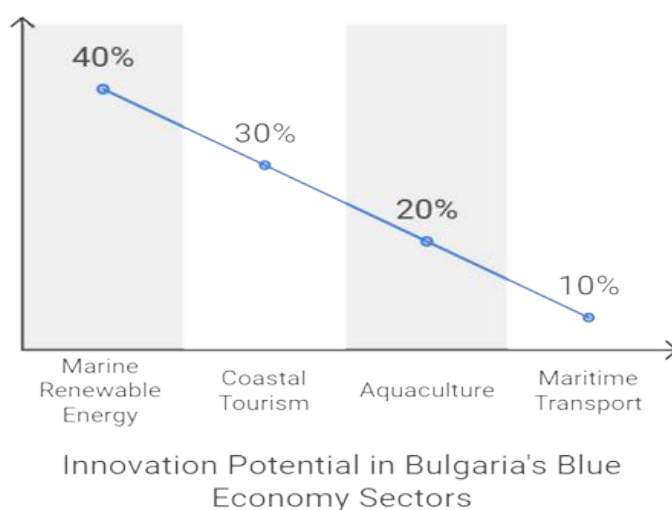
- A) Government policies and regulations (35%)
- B) Corporate social responsibility initiatives (30%)
- C) Economic incentives and international funding (25%)
- D) Community awareness and activism (10%)



Government policies and regulations are identified as the primary drivers of sustainability, with 35% of respondents emphasizing their importance. However, the substantial recognition of corporate social responsibility initiatives suggests that businesses are also playing a key role in advancing sustainability goals.

13. Which blue economy sector in Bulgaria has the greatest potential for innovation?

- A) Marine Renewable Energy (40%)
- B) Coastal Tourism (30%)
- C) Aquaculture (20%)
- D) Maritime Transport (10%)



The marine renewable energy sector is seen as having the greatest potential for innovation, with 40% of stakeholders highlighting this area. This reflects a growing recognition of the need to transition to sustainable energy sources, particularly in light of global climate change and energy demands.

14. What is the most significant benefit of stakeholder collaboration in Bulgaria's blue economy?

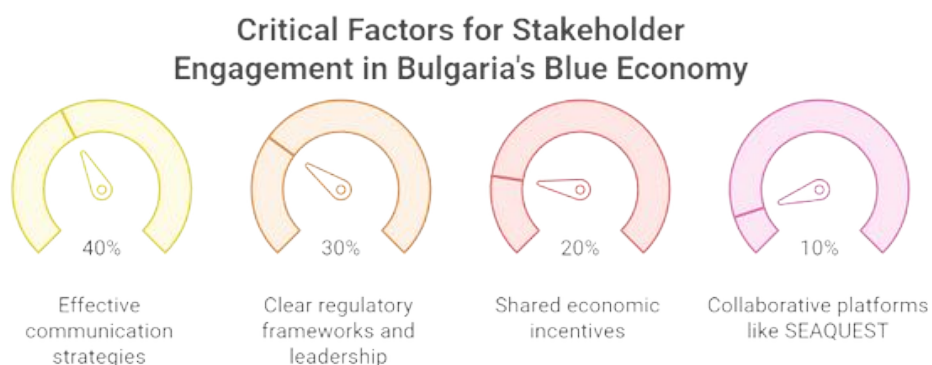
- A) Improved resource management (35%)
- B) Enhanced innovation and competitiveness (30%)
- C) Stronger policy and regulatory alignment (25%)
- D) Increased community and social acceptance (10%)



The most significant benefit identified from collaboration is improved resource management, emphasized by 35% of respondents. This highlights the importance of collaborative efforts in ensuring sustainable use of marine resources, a critical aspect of the Blue Economy.

15. What factor is most critical for successful stakeholder engagement in Bulgaria's blue economy?

- A) Effective communication strategies (40%)
- B) Clear regulatory frameworks and leadership (30%)
- C) Shared economic incentives (20%)
- D) Collaborative platforms like SEAQUEST (10%)



Effective communication strategies are viewed as the most critical factor for successful engagement, with 40% of respondents highlighting their importance. This underscores the need for transparent and inclusive communication methods that facilitate collaboration and foster trust among stakeholders.

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