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ATHENS UNIVERSITY OF ECONOMICS AND BUSINESS

ΣΧΟΛΗ ΟΙΚΟΝΟΜΙΚΩΝ ΕΠΙΣΤΗΜΩΝ
SCHOOL OF ECONOMIC SCIENCES

ΤΜΗΜΑ ΔΙΕΘΝΩΝ & ΕΥΡΩΠΑΪΚΩΝ ΟΙΚΟΝΟΜΙΚΩΝ ΣΠΟΥΔΩΝ
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Working Paper Series
26-09
March 2026

Department of International and European Economic Studies

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Abstract. The Blue Economy, encompassing coastal, oceanic, and sea-related economic activities, is crucial for sustainable global development. The Black Sea, located between Asia and Europe, has significant potential for expansion.. DOORS Black Sea, an EU-funded initiative, aims to revitalize the Black Sea by fostering "blue economy" opportunities through collaboration among industry, academia, and local communities, addressing climate change and human activities' effects on the marine ecosystem. Multi-Actor Forums (MAFs) facilitate the collaboration of diverse national stakeholders from Georgia, Romania, Bulgaria, and Turkey in order to assist scientists in the prioritisation of Black Sea issues, with an emphasis on innovations to address gaps and blue economy policies. This method also contributes to the co-design of the region's System of Systems, which provides the necessary datasets for researchers to address environmental challenges and advance the blue economy. The results from the first round of MAFs show the sectors which should be prioritized in the Black Sea and the most significant challenges per country that need to be put at the forefront of the public dialogue.

Keywords: Living Labs, Co-creation, Blue Economy, Black Sea, Systems Approaches

1. Introduction

Approximately half of the European populace resides within 50 kilometers of the sea, with a majority of the population residing in urbanizations along the coast (Eurostat, 2011). The Sustainable Blue Economy, which establishes the conditions for sustainable governance and implements programs and instruments, significantly influences the prosperity of the Black Sea by encompassing the sustainable utilization of marine and aquatic resources. (European Commission, 2022). The Black Sea Blue Economy, encompassing aquaculture, tourism, shipping, and fisheries, has the potential to generate significant development, employment, and innovation. However, it relies on sustainable marine resource management. The region faces political, socio-economic, and environmental challenges, threatening its economic potential and biodiversity. Regional initiatives align with European Green Deal objectives to transition to a sustainable Blue Economy.

The Common Maritime Agenda (CMA) for the Black Sea and the Black Sea Strategic Research and Innovation Agenda (SRIA) were two flagship strategies that were introduced in 2019 with the objective of enhancing sustainability and enhancing governance and cooperation in the Black Sea (Connect Black Sea, 2019; European Commission, 2019). SRIA has four central aspirations for the Black Sea, including addressing the fundamental research challenges, developing products, solutions, and clusters, constructing critical support systems and research infrastructures, and fostering education and capacity development. CMA is in pursuit of healthy marine and coastal ecosystems, a competitive, innovative, and sustainable blue economy for the Black Sea, and the promotion of investment in the Blue Economy of the Black Sea (Connect Black Sea, 2023). The Black Sea SRIA's Implementation Plan was officially unveiled in 2023. Conversely, the CMA has been actively implemented since its adoption, with annual stakeholder conferences and meetings to advance its objectives.

Living Labs, as defined by ENoLL are "*open innovation ecosystems in real-life environments based on a systematic user co-creation approach that integrates research and innovation activities in communities and/or multi-stakeholder environments, placing citizens and/or end-users at the centre of the innovation process*" are particularly well suited to anchor this process in real word systems (ENoLL, 2024). Living labs are centered around stakeholders, who are broadly defined as all parties that are actively involved in or influenced by the innovation processes facilitated by the Living Lab environment. They are involved in co-creation processes that promote innovation that is specifically designed to address real-world requirements and challenges. (Schuurman et al., 2015). Using the Quadruple Helix Approach, the stakeholders who participate in a Living Lab are selected from the following categories: Industry and Business; Government and Policy makers; Civil Society, NGOs & Associations; and Research and Academia. They work together to ensure that solutions are both socially pertinent and technologically feasible (Hossain et al., 2019; Schäpke et al., 2018). This multi-stakeholder engagement improves the efficacy of Living Labs by harmonizing disparate perspectives, leveraging local knowledge, and addressing specific community priorities in a participatory manner (Schäpke et al., 2018).

The living labs can be used for the co-development of innovation pathways towards sustainability, taking into account local priorities and needs. This present paper is looking at how a certain type of Living Labs, the Multi-Actor Forums (MAFs), are used to support the transition towards a sustainable Blue Economy in the Black Sea through the coordinated implementation of 4 distinct workshops in four Black Sea countries, namely, Bulgaria, Georgia, Romania and Turkey, with a common goal of prioritizing Blue Economy sectors in each country and identifying the challenges that are associated with these sectors.

2. Methodology

Stakeholder mapping is a crucial process that identifies and analyzes individuals, groups, and organizations with a vested interest or influence in the DOORS project. It aids in developing communication strategies, prioritizing engagement efforts, and fulfilling their needs. Stakeholder mapping was conducted for each MAF country individually from July to September 2022, identifying stakeholders from the Quadruple Helix operating within 17 established and emerging industries, as defined by the (European Commission, 2021). Stakeholders were mapped and analyzed using an 'influence/interest' matrix (Figure 1), where 'influence' refers to the stakeholder's power and capacity to effect change and 'interest' refers to their likelihood to engage in activities relevant to the case study focus. The map was validated by an external expert. The core group selected for workshops was those with significant influence and interest, while the lower right and upper left quadrants included those with low interest and influence. This methodology helps identify stakeholders who are most relevant to the study and are more likely to be involved in research endeavors. Identifying stakeholders willing to dedicate time and effort to the research process is also possible through the examination of 'Interest' (Brugha & Varvasovszky, 2000; Mendelow, 1981).

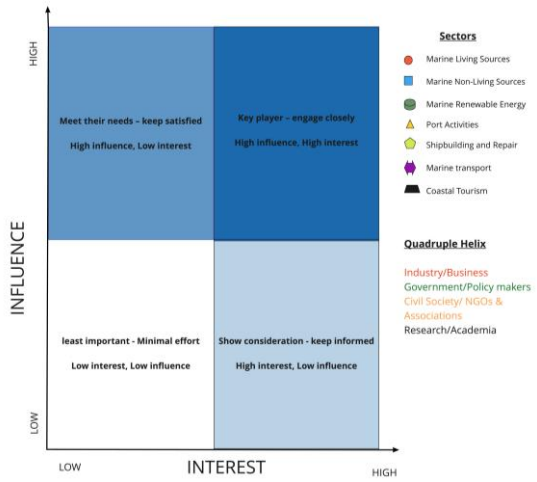

Figure 1 - Influence-Interest Matrix

The principal objective of the first round of MAFs was to establish Blue Economy industries as national priorities and to map the needs and challenges for each priority sector using the PESTLE framework. During the workshops, an overview of the DOORS project was delivered to the participants, encompassing both its own objectives and those of the MAF. The MAFs were comprised of two core exercises. In the first, the "Established" and "Emerging" BE sectors, defined by (Caribbean Development Bank, 2018), were used to set national priorities in each of the four BS countries. The second exercise employed the PESTLE (Political, Environmental, Social, Technological, Legal, Economic) approach to identify and analyze the challenges that are associated with the top five prioritized sectors. This activity incorporated their perspectives and information to enhance our understanding of the gaps and needs.

3. Results and Discussion

The Blue Economy priority sectors for the Black Sea, including fishing and marine research and development, are based on the results of the 1st MAF for Bulgaria, Georgia, Romania, and Turkey (Table 1). The region accounts for 37.4% of the complete FAO-designated fishery territory, with Bulgaria and Romania having fishery interests in the Black Sea. In 2019, revenues and GVA were expected to reach €10.5 million and €7.4 million, respectively (European Commission, 2022). The Black Sea region is experiencing an increase in tourism and sustainability concerns, including inadequate visibility, limited accessibility during high demand periods, and environmental strains. The Tourism 4.0 for the Black Sea initiative, co-financed by the European Maritime and Fisheries Fund, aims to equip local stakeholders with the necessary information to understand current trends, visitor impact, and movement patterns. The marine and coastal tourism sectors in Bulgaria, Georgia, and Romania generate substantial value, while Georgia, Turkey, and Romania are experiencing an increase in marine aquaculture cultivation. Aquaculture productivity in the Black Sea region has steadily increased over the past few years, with the region producing over 700,000 tonnes of farmed seafood in 2019 (FAO, 2023).

Romania and Turkey have recognized Ocean Renewable Energy as a critical economic sector, with progress being made in the commercial viability of floating offshore wind in deep waters and hazardous environments. This technology has the potential to unlock previously untapped markets in the Mediterranean Sea, Black Sea, and Atlantic Ocean. Meanwhile, Georgia and Bulgaria have designated maritime and port sectors as areas of paramount significance, with the transport sector contributing an average of 145 million euros to their GDP over the past two decades (The World Bank, 2020; Trading Economics, 2023). BlueInvest, a EU-financed initiative, aims to enhance investment and innovation in sustainable technologies for the blue economy by providing financial readiness and access to early-stage enterprises, small and medium-sized enterprises (SMEs), and scale-ups. These results align with the Common Maritime Agenda for the Black Sea and the Black Sea Strategic Research and Innovation Agenda, which define the roles of these two sectors in the Blue Economy. The SRIA supports food systems research in fields such as biotechnology, fisheries, recruitment, stock

assessment and sustainability, and marine protected areas (MPAs). However, ship-building and offshore oil/gas, which are prioritized in the MAFs but underemphasized in the CMA and SRIA, are considered critical industries for regional economies and should be included in these approaches.

Table 1 - Black Sea Blue Economy sectors prioritization

Sector	Definition	BE Sector	Black Sea countries
Capture Fisheries	The practise of obtaining naturally occurring living resources in both freshwater and marine environments in a sustainable manner.	Established	Bulgaria, Georgia, Turkey, Romania
Marine R&D	The activities centred around the advancement of technology, knowledge, and capabilities pertaining to marine environments, encompassing oceans, seas, and other aqueous bodies.	Established	Bulgaria, Georgia, Turkey, Romania
Marine & Coastal Tourism	The provision of tourism-related services in and around littoral or marine environments, which support the local community's sustainable development.	Established	Bulgaria, Georgia, Romania
Marine aquaculture	The practise of aquaculture and farming with the intention of minimising any adverse effects on the purity of air, water, and soil.	Emerging	Georgia, Turkey, Romania
Shipping/ Ports	The operations related to maintaining a sustainable maritime transport ecosystem, encompassing terminal services and the conveyance of passengers and cargo via water.	Established	Bulgaria, Georgia
Ocean Renewable Energy	The production of pure and renewable energy from natural sources, such as wind, wave, tidal, and solar, at sea, offshore, on land, and in close proximity.	Emerging	Turkey, Romania
Shipbuilding	The goods and services necessary for the construction, upkeep, restoration, and repair of vessels used for ecologically conscious maritime transportation.	Established	Turkey
Marine Business Services	The commercial activities that rely on water and are associated with marinas and other vessel service operations.	Established	Bulgaria
Offshore oil & gas	The extraction of gas and hydrocarbons from submerged sources.	Emerging	Turkey

Table 2 - Challenges in the Black Sea region as presented in the first round of MAFs

POLITICAL	ENVIRONMENTAL	SOCIAL

• Geopolitical instability • Lack of collaboration between all state institutions • Need for regional cooperation and intersectoral synergies • Lack of international cooperation • Insufficient political will • Lack of vision and long-term planning • Lack of a Black Sea brand at local and regional level • Lack of compliance with political obligations towards the EC	• Pollution and environmental degradation • Seawater quality • Imbalance of aquaculture sustainability and overfishing • Climate change's impact on biodiversity	• Need for training and capacity building in all Blue Economy sectors (limited human resources available) • Lack of job opportunities • Public awareness on aquaculture sector • Need for connectivity through cultural and natural heritage, between neighbouring countries
TECHNOLOGICAL	**LEGAL**	**ECONOMIC**
• Need for marine research • Need for initiatives, such as a beach quality award system (e.g., Blue Flag) • Lack of adequate infrastructure • Lack of advanced technologies (e.g., for monitoring the fishing vessel in the region) • Need for digitization and creation of a unitary database. • Need for use of non-polluting technologies	• Harmonization of national and EU legislation • Specific and integrated legislations drafted clearly and concisely, with the elimination of legislative loopholes. • Lack of implementation of existing regulations • Lack of carrying out adequate monitoring and control • High bureaucracy • Corruption	• Need for state aid for fisheries and aquaculture sectors • Need for removing the tax barriers for the maritime sector • Lack of quotas in the fishing industry • Financial crisis • High international competition in marine products • Lack of Investments

The initial round of MAFs has also highlighted the challenges faced by the region, including environmental degradation and pollution (Table 2). The four Black Sea states face significant obstacles at the national level, such as lack of investments in coastal infrastructure, inadequate renewable energy, and insufficient funding for scientific research. Georgia faces issues with marine litter and waste management, lack of a beach quality award system, and insufficient funding for research. Turkey and Romania prioritize marine litter and waste surveillance and control, with Romania emphasizing digitalization. The need for interdisciplinary, international, and institutional collaboration is crucial for promoting the adoption of the Blue Economy in the Black Sea region.

4. Conclusions

This study examined the utilization of a specific type of Living Labs, the Multi-Actor Forums (MAFs), to facilitate the transition to a sustainable Blue Economy in the Black Sea. This is achieved through the coordinated implementation of four distinct workshops in four Black Sea countries, namely, Bulgaria, Georgia, Romania, and Turkey. The shared objective is to identify the challenges associated with Blue Economy sectors in each country and to prioritize them. The results show that there is significant regional consensus on sectors such as capture fisheries, marine research and development, aquaculture, and tourism. These sectors are crucial for economic development and ecological sustainability, but they are often underrepresented in regional policies like the Common Maritime Agenda (CMA) and the Strategic Research and Innovation Agenda (SRIA). Sustainability is a prevalent issue across all sectors, including the reduction of tourism's environmental impact, the shift to renewable energy, and the promotion of circular economy ideas.

The policy landscape has both strengths and deficiencies, with some countries connecting their policies with EU frameworks to promote innovation, while others encounter bureaucratic bottlenecks, legal loopholes, and uneven execution. Investment in strategic vision, governance changes, and optimized bureaucratic procedures is essential. Enhanced public awareness and developing technical knowledge are also crucial for fostering private sector and community engagement in the Blue Economy. Economic limitations and technological inadequacies continue to pose significant obstacles to the Blue Economy. Restricted access to venture capital, inadequate initial investment, and deficient infrastructure hinder entrepreneurial development. Technological deficiencies in digitalization and data management impede efficiency and decision-making. Establishing resilient finance structures and promoting an innovative culture via government-sponsored grants, subsidies, and tax incentives can mitigate these problems and propel sustained advancement.

Cross-sectoral insights highlight the importance of inclusion, regional cooperation, and strategic long-term planning. Public engagement, youth participation, and community-led projects are essential for harmonising local priorities with regional objectives. Enhancing cross-border collaborations, disseminating exemplary practices, and using shared expertise can augment regional influence. Innovations focused on sustainability, especially in renewable energy and circular economy practices, should remain fundamental to regional strategy. Integrating these initiatives with global frameworks like the European Green Deal and the UN Sustainable Development Goals will enhance the resilience of the Black Sea Blue Economy.

5. Acknowledgments

This paper is an output of the science project DOORS. DOORS has received funding from the from the European Union’s Horizon 2020 Framework Programme for Research and Innovation under grant agreement No 101000518.

6. References

Caribbean Development Bank. (2018). Financing the Blue Economy: A Caribbean Development Opportunity. In . https://www.caribank.org/publications-and-resources/resource-library/thematic-papers/financing-blue-economy-caribbean-development-opportunity

Connect Black Sea. (2019). *The SRIA | Black Sea Connect*. http://connect2blacksea.org/the-sria/

Connect Black Sea. (2023). *Black Sea SRIA Implementation Plan*. http://connect2blacksea.org/wp-content/uploads/2023/08/23062023-Black-Sea-SRIA-Implementation-Plan.pdf

ENoLL. (2024). *Living Labs - ENoLL*. https://enoll.org/living-labs/#living-labs

European Commission. (2019). *Common Maritime Agenda (CMA) for the Black Sea*. https://black-sea-maritime-agenda.ec.europa.eu/

European Commission. (2021). *COM (EU) 2021/240 COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS on a new approach for a sustainable blue economy in the EU Transforming the EU's Blue Economy for a Sustainable Future*. . https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2021:240:FIN

European Commission. (2022). *The EU blue economy report 2022*. Publications Office of the EU. https://op.europa.eu/en/publication-detail/-/publication/156eecbd-d7eb-11ec-a95f-01aa75ed71a1/language-en

FAO. (2023). *Recent boom in aquaculture under threat in the Black Sea region | General Fisheries Commission for the Mediterranean (GFCM)*. Food and Agriculture Organization of the United Nations. https://www.fao.org/gfcm/news/detail/en/c/1506130/

Hossain, M., Leminen, S., & Westerlund, M. (2019). A systematic review of living lab literature. *Journal of Cleaner Production*, *213*, 976–988. https://doi.org/10.1016/J.JCLEPRO.2018.12.257

Schäpke, N., Stelzer, F., Caniglia, G., Bergmann, M., Wanner, M., Singer-Brodowski, M., Loorbach, D., Olsson, P., Baedeker, C., & Lang, D. J. (2018). Jointly Experimenting for Transformation? Shaping Real-World Laboratories by Comparing Them. *GAIA - Ecological Perspectives for Science and Society*, *27*, 85–96. https://doi.org/10.14512/GAIA.27.S1.16

Schuurman, D. (2015). *Bridging the gap between Open and User Innovation? : exploring the value of Living Labs as a means to structure user contribution and manage distributed innovation*. http://hdl.handle.net/1854/LU-5931264

Schuurman, D., De Marez, L., & Ballon, P. (2015). *Living Labs: a systematic literature review*. http://scholar.google.be/